

The Chemical Age

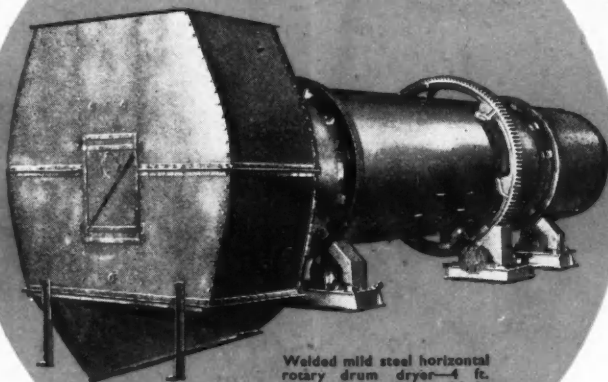
Weekly Journal Devoted to Industrial and Engineering Chemistry

Vol. L
No. 1286

SATURDAY, FEBRUARY 10, 1944
REGISTERED AS A NEWSPAPER

6D. PER COPY
POST FREE 8D.

OXLEY CAN TACKLE IT!



Welded mild steel horizontal
rotary drum dryer—4 ft.
11½ in. inside dia. by 26 ft.
3 in. long. Shell ½ in. thick.

WELDED CONSTRUCTION OR REPAIR OF ALL KINDS OF CHEMICAL PLANT

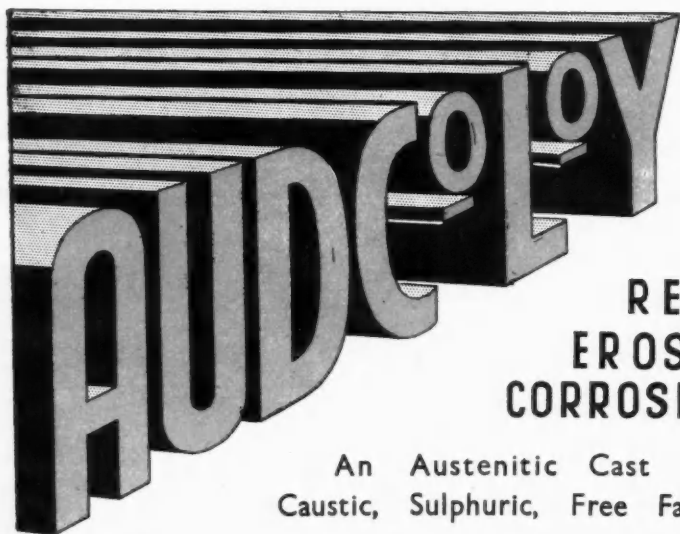
We are equipped to undertake the construction by welding of chemical vessels, tanks, stills, etc. Plant damaged by corrosion, etc. can be readily repaired by Oxley Metal Surgery.

We also specialise in homogeneous lead lining.

OXLEY
ENGINEERING CO. LTD.

HUNSLET, LEEDS, 10
'Phone : Leeds 27468.
'Grams : Oxbros, Leeds.

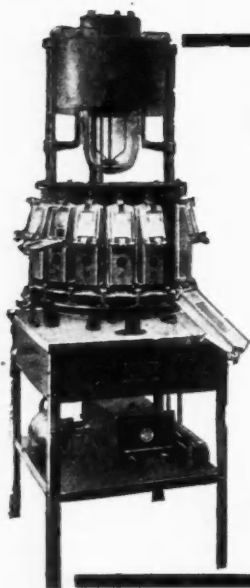
London : Winchester House,
Old Broad Street, E.C.2.
'Phone : London Wall 3731.
'Grams : Asbengpro, Stock,
London.



**RESISTS
EROSION
CORROSION**

An Austenitic Cast Iron for
Caustic, Sulphuric, Free Fatty Acids.

AUDLEY ENGINEERING COMPANY LIMITED · NEWPORT · SHROPSHIRE · England



The
K.B.B. FUGITOMETER

for rapidly testing the fading characteristics of paints and the durability of varnishes, etc.

The K.B.B. Fugitometer is a complete unit, with electric lamp, air circulating system, motor control switches, and steadying resistance

BRITISH MADE BY

KELVIN, BOTTOMLEY & BAIRD LTD.





*Roller
Pitch*

U

DRYING

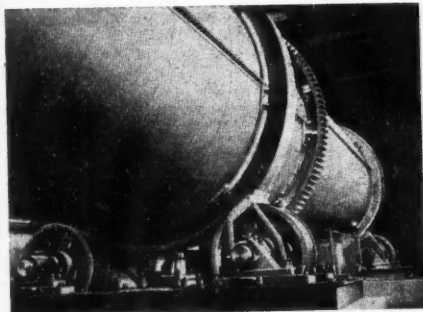
★ FOR INDUSTRY AND AGRICULTURE

The RIGHT plant to suit YOUR drying problems, can be supplied by

BAMAG

BAMAG LIMITED
UNIVERSAL HOUSE
40, BUCKINGHAM PALACE ROAD,
LONDON, S.W.1.

Telephone: SLOane 9282.



8a

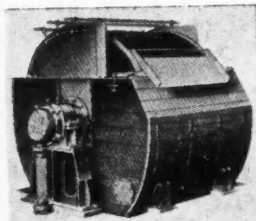
UNIFLOC
REGD. TRADE MARK

Plant for the Chemical Industry

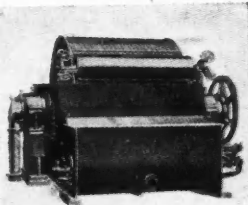
for ACID NEUTRALIZATION, CLARIFICATION OF LIQUIDS, DEWATERING OF SLUDGES, EFFLUENT PURIFICATION, FILTRATION AND FLOCCULATION, PICKLING LIQUOR TREATMENT, PURIFICATION OF TRADE WASTE, SEDIMENTATION AND THICKENING, SEPARATION OF SOLIDS FROM LIQUIDS, SODA RECOVERY. WET MATERIAL HANDLING

including

AGITATORS CAUSTICIZERS, CLARIFIERS, CLASSIFIERS, CONVEYORS, DEWATERING MACHINES, ROTARY VACUUM FILTERS, SAND WASHERS, SLUDGE PUMPS, THICKENERS, etc.



Rotary Pulp Washing Machine, with Pitch Pine Trough, Wash Gear and Scraper Knife.



Rotary Vacuum Filler, with Take-off Roller and Repulper.

UNIFLOC REAGENTS LTD.,
— SWANSEA —

Phone: Swansea 5164
(3 lines)

Grams: Unifloc, Swansea

Safety First

SAFETY FIRST

THE "OLDBURY" PATENT CARBOY DISCHARGER

will empty and elevate up to 50 feet the contents of any carboy, bottle or vessel, and complies with all the conditions of the Factory Act of 1937.

**KESTNER EVAPORATOR & ENGINEERING
CO., LTD.**

5, Grosvenor Gardens, Westminster, London, S.W.

DERMATITIS costs so **MUCH.**

...and

Sternocleanse SO LITTLE

SKIN SCREEN AGAINST DERMATITIS

STERNOL Ltd., FINSBURY SQ., LONDON, E.C.1

Write Industrial Specialities Dept. 31

Sternocleanse No. 1 protects hands against grease, paint, etc., and Sternocleanse No. 2 against water-wet and chemical solutions, spirits, etc. Packed in cases of 36 tubes, 12x2-lb. tins, 6x7-lb. tins. Also 28-lb. and 1-cwt. kegs.

INDUSTRIAL DERMATITIS

accounts for the majority of the cases of industrial disease occurring in the factories annually and these can be prevented (*Min. Lab. & Nat. Serv.*)

TO AVOID WASTAGE OF LABOUR IS A NATIONAL DUTY

ROZALEX

is the barrier substance for the prevention of dermatitis and has given satisfaction to thousands of firms for many years.

There is a grade for every trade

ROZALEX LIMITED 10 NORFOLK STREET MANCHESTER 2



Solvent Recovery Plant

Carbon Adsorption
System

British Carbo-Norit Union, Ltd.
16, Queen Anne's Gate, S.W.1.

RUBBER FRICTION SURFACE BELTING & ENDLESS VEE ROPES

of
Superlative Quality
Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.
BURSLEM - Stoke-on-Trent

*Phone: Stoke-on-Trent 7181.

*Grams: Belting, Burslem

Safety First

fire
-an enemy



Illustrated is one of the extinguishers installed by many of the leading chemical manufacturers—the Foamite Dual-seal 2-gallon machine.

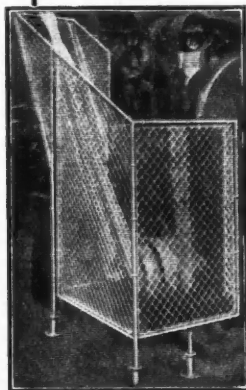
Full particulars of this and other extinguishers will be sent upon request.

FOAMITE LTD.

LANGLEY
BUCKS.

Telephone : Telegrams :
LANGLEY 291 FOAMITE-SLOUGH

POTTER'S
Machinery Guards



● DESIGNED
FOR SAFETY

● BUILT
FOR SERVICE

Potter's guards are installed in works throughout the country and are distinguishable by their sound construction, good fitting and many exclusive features.

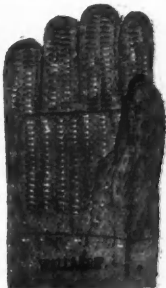
F.W. POTTER & SOAR LTD

PHIPP STREET, LONDON, E.C.2
Telephones : BIPhosphate 2177 (3) (lines)

EVER
TRUST
Y"



Industrial
**SAFETY
EQUIPMENT**



**RESPIRATORS AND GAS MASKS
GLOVES FOR EVERY INDUSTRIAL
REQUIREMENT - GOGGLES, SPEC-
TACLES AND WELDING SHIELDS**

Safety Belts and Hoisting Apparatus. Grinding Machine and Shafting Guards. Asbestos Clothing for Fire Protection. Stretchers and First Aid Equipment.

Write to-day for a copy of our "Blue Book for Safety Appliances"—the result of fifty years' experience in protecting industry.

WALLACH

LTD.

49 TABERNACLE ST. LONDON, E.C.2
CLerkenwell 1448/9

IMPORTANT ANNOUNCEMENT

TO WAGES & SALARIES DEPARTMENTS

IF you adopt the **FOUR-IN-ONE** Wages method, the total hours of your Wages Office may well be less than at present, even with the additional work that will be caused by **PAY-AS-YOU-EARN**.

ONE HAND-WRITTEN ENTRY—BY CLEAN CARBON TRIPLICATION—PREPARES SIMULTANEOUSLY:—

WAGES BOOK OR PAY ROLL: This form, when completed and inserted in its secure Loose-leaf Binder, becomes your permanent Wages Book. An undercopy gives you . . .

PAY ADVICE SLIPS:—perforated ready for separation (and gummed if required); each, being a copy of the relative line of the Wages Book, shows the employee how his wages are calculated. The original entry for the above two carboned forms is the . . .

INDIVIDUAL PAY RECORDS:—As the wages of each employee are calculated, his own Pay Record is taken from its container and placed over the above two forms. You thus get a separate record for each employee, of his earnings, fund contributions, etc.

This set of Three forms embodies all the columns needed for speedy . . .

PAY-AS-YOU-EARN calculations. Subject to the approval of your local Inspector of Taxes, the one writing you make will also be sufficient for official purposes, and you need not fill in week by week each employee's Tax Card. . . .
ONE ENTRY INSTEAD OF THE WHOLE 52.

For further information, without any obligation, write to—**Kalamazoo Ltd.**, Birmingham, 31, giving the number of employees and your present Wages Book ruling. We often save as much as 40% of Wages Office time, but if we cannot save you time we shall tell you quite frankly.



announce that

ANHYDROUS HYDROGEN FLUORIDE
AND
PURE AQUEOUS HYDROFLUORIC ACID
ARE AVAILABLE IN SMALL QUANTITIES

Full information supplied on request to:

IMPERIAL CHEMICAL INDUSTRIES LTD.

LONDON, S.W.1

C.N.1107

NOW IN PRINT**3rd Edition****'ANALAR' STANDARDS FOR
LABORATORY CHEMICALS**

Containing the published specifications of
over 200 Laboratory Chemicals with
maximum limits of impurities.

250 pages
Demy 8vo.

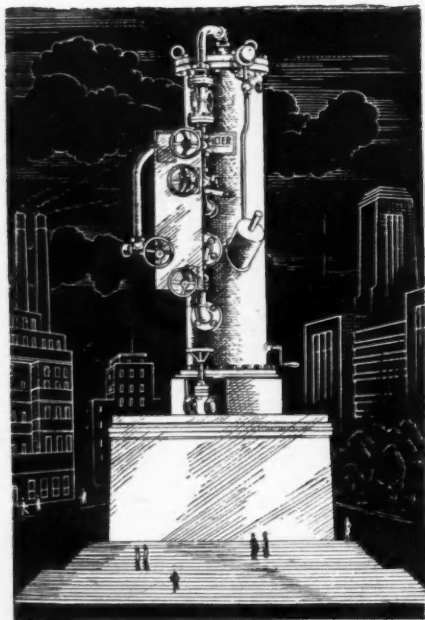
5/-

Per copy
Postage Extra.

Orders will be dispatched as soon as received from the Printers.

HOPKIN & WILLIAMS LTD.

Makers of Fine Chemicals, Reagents, etc.

16-17 ST. CROSS STREET, LONDON, E.C.1**A Monument to
Quality**

Brilliant filtrates from all types of chemical liquids produced through the Metafilter are a monument to the high-quality filtration which it ensures. In addition to chemical liquids, the Metafilter handles with equal facility and success synthetic drugs, biochemical products, gelatine, syrups, and extracts; and it withstands the action of acids, alkalis, oils, and organic liquids.

Metafiltration

**THE METAFILTRATION CO. LTD.,
BELGRAVE ROAD, HOUNSLOW,
MIDDLESEX.**

Telephone:
Hounslow 1121/2/3

Telegrams:
Metafilter, Hounslow.

ACID RESISTING CAST IRON VESSELS

for the
CHEMICAL INDUSTRIES

1. 9' 9" inside diameter \times 9' 8" deep
2. 10' 0" inside diameter \times 6' 8" deep
3. 9' 9" inside diameter \times 6' 0" deep



WIDNES
Foundry

& ENGINEERING COMPANY LIMITED

WORKS

WIDNES

LANCS

LONDON OFFICE

BRETENHAM HOUSE W.C. 2

TEMPLE BAR 9631



A common or garden battle hat

A symbol of war that needs steel, and steel needs scrap. Not so impressive perhaps, as guns, tanks, ships and planes, nevertheless, just as important.

Iron and steel scrap, old plant and machinery is still urgently required for the war effort. If you have any scrap clearance problems, please contact our nearest branch.

Cox & Danks Ltd.

**IRON & STEEL SCRAP MERCHANTS
DEMOLITION & DISMANTLING
ENGINEERS**

London: PARK ROYAL, Tel.: Willesden
5811 HURLINGHAM, Tel.: Renown 4211.
BRENTFORD, Tel.: Ealing 6741. FULHAM,
Tel.: Flaxman 0071. SHEFFIELD, Tel.:
41216. MANCHESTER, Tel.: Pendleton 2481.
BIRMINGHAM, Tel.: Broadwell, 1611.
NEWCASTLE-ON-TYNE, Tel.: 20685.
SWANSEA, Tel.: 4111. BEDFORD, Tel.:
3258. COVENTRY Tel.: 5304.

BARIUM CARBONATE
BARIUM HYDRATE
BARIUM MONOXIDE
BARIUM NAPHTHENATE
BARIUM OLEATE
BARIUM PEROXIDE
BARIUM STEARATE
BARIUM SULPHATE
BARIUM SULPHIDE

SODIUM HYPOCHLORITE
SODIUM SULPHIDE
SODIUM PERCARBONATE

TITANIUM OXIDE

SOAPS
ALKALINE CLEANERS
HYDROGEN PEROXIDE
AMMONIUM PERSULPHATE
BENZOYL PEROXIDE
CALCIUM PEROXIDE
MAGNESIUM PEROXIDE
POTASSIUM PERSULPHATE
UREA PEROXIDE
ZINC PEROXIDE

SODIUM ACID PHOSPHATE
SODIUM ACID PYROPHOSPHATE
SODIUM PERPYROPHOSPHATE
SODIUM PYROPHOSPHATE

LAPORTE

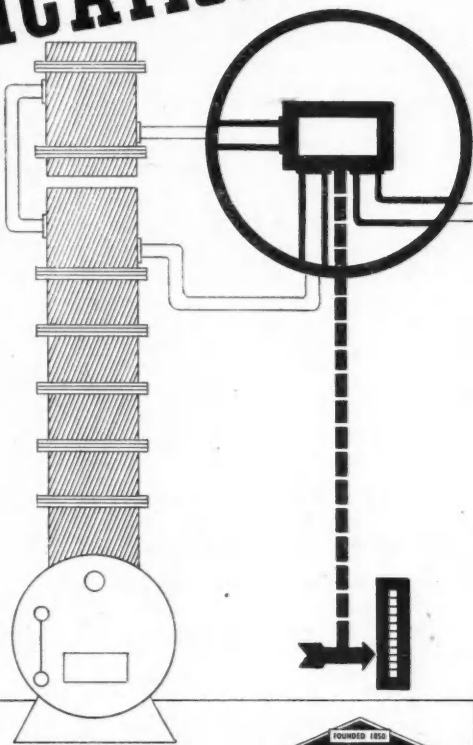
B. LAPORTE Ltd. LUTON Phone: LUTON 891
Grams: Laporte Luton

SALES SERVICE & DEVELOPMENT DEPT. INVITE ENQUIRIES

Where
Condens
PROPO
provi
POSITIV
mean
of re
it may
indicat
LEVEL
desirec



★ REFLUX CONTROL FOR RECTIFICATION STILLS



Where overhead Reflux Condensers are used this PROPORTIONAL DIVIDER provides a SIMPLE POSITIVE and ACCURATE means of control of reflux ratio and it may be operated and indicated AT GROUND LEVEL or any other desired position.



For further particulars write to:

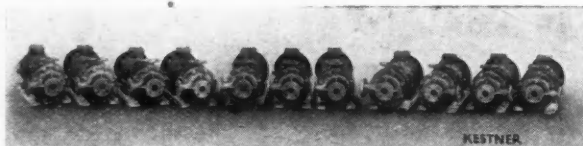
W. C. HOLMES & CO. LTD

HEAD OFFICE . TURNBRIDGE . HUDDERSFIELD

LONDON OFFICE . 119 VICTORIA STREET, S.W.1 . MIDLANDS OFFICE . 21 BENNETT'S HILL, BIRMINGHAM 2



A NEW ACID PUMP GLANDLESS—SELF-PRIMING



PATENT GLANDLESS ACID PUMPS

- NO PACKING GLAND ● NO BEARING SURFACE IN CONTACT WITH ACID
- MADE IN SPECIAL MATERIALS RESISTANT TO ALL CORROSIVE LIQUIDS
- LONG AND TROUBLE-FREE LIFE ASSURED
- SELF-STARTING EVEN AFTER A LONG SHUT-DOWN.

Full Particulars from:

KESTNER EVAPORATOR & ENGINEERING CO., LTD.

Chemical Engineers 5, GROSVENOR GARDENS, LONDON, S.W.1

THE HEART OF ENGLAND IS THE HOME OF LIMESTONE

LIMESTONE

of the highest chemical purity for all

CHEMICAL AND INDUSTRIAL
PURPOSES

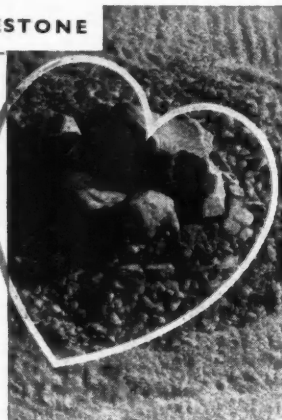
LUMP • CRUSHED • POWDER

The geographical distribution of our many quarries ensures efficient delivery service over a wide area at economical rates.



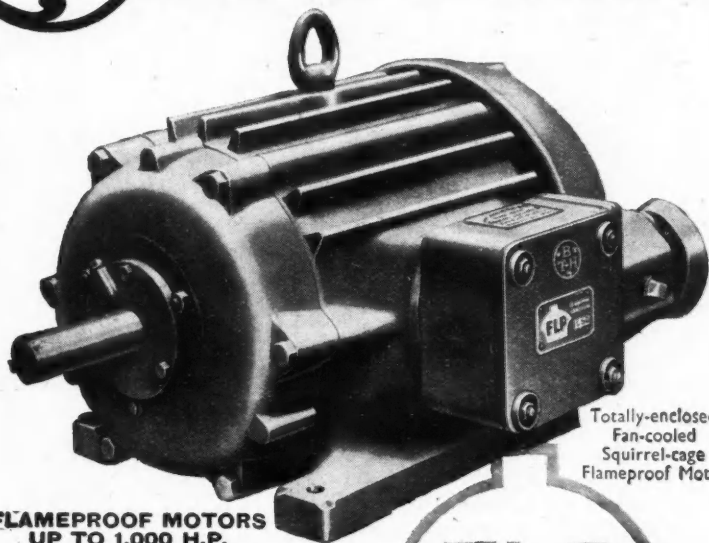
DERBYSHIRE STONE LTD

BANK HOUSE, THE BRIDGE, MATLOCK Telephone Matlock 396





FLAMEPROOF MOTORS



Totally-enclosed
Fan-cooled
Squirrel-cage
Flameproof Motor

FLAMEPROOF MOTORS

UP TO 1,000 H.P.

(Squirrel-cage from $\frac{1}{2}$ H.P.)
(Slip-ring from 5 H.P.)

and

AN EXTENSIVE RANGE OF
FLAMEPROOF CONTROL GEAR

For use in collieries, oil
refineries, paint and varnish
works, spray booths, and any
situation where inflammable
gases or liquids may be present.



*All-steel cyclindrical frame
motors and gate-end control
gear are available for under-
ground conveyor drives, etc.*

BTH

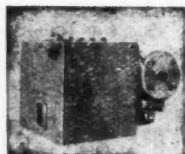
THE BRITISH THOMSON-HOUSTON CO., LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C. 2.



A3243

TATE

SEMI-BALANCED
SOLENOID OPERATED
VALVES



suitable for steam, water,
air, spirits, oil, and
chemicals.

JAMES TATE & CO.
VICTORY WORKS, EAST PARADE
BRADFORD

CRESYLIC

HIGH BOILING
TAR ACIDS

CRESYLIC
CREOSOTE

NAPHTHALENE

Prices
from

PYRIDINE

MIRVALE

CHEMICAL CO., LTD., MIRFIELD, YORKS.
TELEPHONE: MIRFIELD 2157

FOUNDED 1830

Old-established yet up-to-date in every detail, this organisation provides a specialised service for the chemical industry that ensures rapid delivery and low prices all the time

MANUFACTURERS AND PROPRIETORS OF
"INVICTA" DECOLOURISING
CARBON

PLUMBAGO CHARCOAL (Wood & Animal) MANGANESE

"INVICTA" BITUMINOUS MATERIALS
FOR ROAD CONSTRUCTION

GRINDING With improved mills, of
every description of
chemical and other materials for the trade

THOMAS HILL-JONES, LTD.

MANUFACTURING CHEMISTS, INVICTA WORKS, BOW COMMON LANE LONDON, E.3.

and at MEESON'S WHARF, BOW BRIDGE, E.15 :: CONTRACTORS TO H.M. GOVERNMENT

Telephone : EAST 3285 (3 lines).

Telegrams : Hill-Jones Bochurch, London



FEBRU

THE

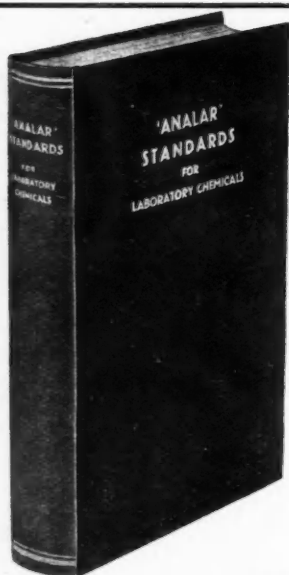
Over
200
Years



Faded account books still in existence show that the Staveley Works were in active operation as far back as the year 1690. The Staveley Coal & Iron Co. Ltd. was one of the first to be registered under the Act of 1863.

THE STAVELEY COAL & IRON CO., LIMITED.

NR. CHESTERFIELD



'ANALAR' STANDARDS for LABORATORY CHEMICALS

IN THE PRESS

Third and Revised Edition

Price : 5s. 0d.

Postage extra.

The monographs in " 'Analar' Standards for Laboratory Chemicals " set out in the clearest possible form full information as to the purity of the materials concerned, together with a description of the analytical technique by means of which the assurance of such purity is established. The interpretation of the tests has been tabulated throughout the monographs as the maximum permissible limits of impurities in percentages or as parts per million.

Orders accepted now

**The British Drug Houses
Ltd.**

London, N.1.

A note on

VATS and the timber shortage

We still possess limited stocks of the usual imported timbers suitable for chemical Vats, but to save shipping space it is important that whenever possible home-grown timbers should be used instead. We have stocks of high quality English Oak and English Larch in seasoned condition and we hope that our customers will co-operate by considering the use of these timbers for their Vats wherever possible.



Further note. Since the war began we have so far fully maintained our pre-war high standards as to quality and seasoning of timber, and it is our intention to continue thus. If, however, circumstances should at any time compel otherwise, any quotation affected would contain an appropriate notification.

CARTY

AND SON, LIMITED

Harders Rd., Peckham, LONDON, S.E.15

Phone: New Cross 1824

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON

Telephone: CENTRAL 3212 (10 lines)

GLASGOW: 116 Hope Street (Central 3970)

BIRMINGHAM: Daimler House, Paradise Street (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Bann Brothers Limited.

VOL. L
No. 1286

February 19, 1944

Annual Subscription 21s.
Overseas 26s.

Organic Chemicals from Petroleum

THE subject of the home refining of petroleum has been discussed on several occasions in these columns. We return to it again because there is some evidence that it is becoming a live political issue. Two papers on the subject have recently been read in London, one before the Institution of Chemical Engineers, by Mr. J. C. G. Boot, and the other before the Institute of Fuel, by Mr. Harold Moore, while Dr. F. Kind has addressed the Society of Chemical Industry and the Institute of Petroleum in Manchester. We do not propose to discuss these papers in any detail; that is a technical matter. Here we are concerned with the broad lines of policy. What should we do about setting up an organic chemical industry based on coal and/or petroleum?

There are two proved primary methods based on coal—hydrogenation and the Fischer-Tropsch synthesis. Both of these result in products that are either excellent fuels or are more than promising raw materials for the chemical industry. Mr. Moore's view is that these processes have only been workable when supported by very high subsidies, and with the pre-war price structure their products are so much more expensive than

the world price of petroleum derivatives that there would be little object in continuing to work upon them; though in view of the possible exhaustion of petroleum, we should continue to operate plants based on these processes as a "second string." Part of our internal requirements of oil fuels of every kind can be derived from an increase in carbonisation of coal, but the extent of that increase can only be equal to the increased demand for coke and gas. The real bulk must continue to be met, as it is now, by importation of petroleum. The crux of the problem, therefore, is whether we should import crude petroleum and refine it here, or whether we should (as we do now) import the finished products.

The petroleum industry, with some striking exceptions, will have nothing to do with home refining. There may be some reason for this which is not apparent on the surface; or perhaps simply that it would not be a paying proposition. In the present political temper of the world, it is clear that "under-the-counter" business arrangements will not be tolerated either in America or Great Britain; we shall, therefore, conclude that the objection to the proposal is based on economic considerations; it is more profitable

On Other Pages

<i>Notes and Comments</i> ...	181
<i>Argument on Patents—Sup-</i> <i>pressing Information—Dumb</i> <i>Obstinacy—Penicillin Critics</i> <i>Answered—Magnesium Muddle</i> <i>—Redundant Factories</i>	
<i>Compulsory Patent Licences</i> ...	183
<i>The Future of South Wales</i> ...	187
<i>Parliamentary Topics</i> ...	188
<i>Fire Risks and Post-War Indus-</i> <i>try, I</i> ...	189
<i>Petroleum Refining</i> ...	190
<i>Seaweed Gums</i> ...	191
<i>Sulphur Dioxide in Gelatine</i> ...	192
<i>Dicalcium Phosphate</i> ...	192
<i>Personal Notes</i> ...	193
<i>Forthcoming Events</i> ...	193
<i>Plastics Organisation</i> ...	193
<i>General News from Week to Week</i>	194
<i>Stocks and Shares</i> ...	196
<i>British Chemical Prices</i> ...	197

to the petroleum producer to refine abroad than to bring the raw material to this country to be refined. Mr. Shinwell, former Minister of Mines, who was Chairman of the Institute of Fuel meeting, asked that proposals for setting up new industries in this country should not be judged on a strictly financial basis; an industry that was not immediately profitable might still have so great a stimulating effect on other industries as to be, in the sum, advisable and profitable. This raises a point of some difficulty. A Government may say that in preference to paying from the public pocket a considerable sum in unemployment relief, it would be better to set up an industry that would run at a loss for a time. Governments have money to play with that private firms have not. A private firm must always take the better financial course, or it will disappear *via* Carey Street. If, then, the petroleum industry can prove that there is a handsome balance in favour of refining abroad, the Government must decide what its policy is to be, and adopt that policy which is best for the nation. What is there to put against some losses (or reduced profits as the case may be) to the petroleum industry that might persuade the Government to make such provisions as would ensure that petroleum is refined in this country?

In answering this question, we propose to be outspoken. Britain and America understand one another well enough by now to discuss these problems fully and frankly. We know that manufacturers generally, in America, are actively making their plans for peace-time production. They do not want unemployment and trade depression, nor do we. Neither nation wants to profit at the other's expense, but neither nation can afford to lag behind the other in technical development. We shall have to fight as hard to win the peace as we did to win the war. We have a duty to the world, and our work cannot be done if we are poor, second-rate, a declining force. It is in that spirit that we shall examine this problem.

It cost this country in 1939, according to Mr. Moore, about twice as much to buy the finished products as to buy the raw petroleum. After the war, with the increased complexity of refining, the ratio of cost of finished products to cost of crude oil will probably leap to 4 or 5 times. By importing the refined pro-

ducts we are paying others to do this work, and presenting them with work and profits that our own people should have. The second thing we lose is an organic chemical industry. A great chemical industry has grown up around petroleum. Attempts have been made to refine petroleum here before; they failed largely because 20 per cent. of the oil was converted into gas for which there was then no known use. To-day, as Mr. Boot and Dr. Kind have shown, a great organic chemical industry exists, based on this gas and on other fractions of the oil. We thus do not only lose the organic chemical industry in the present; we lose also the power to initiate it in the future. Mr. Boot's paper gave a great deal of cataloguing of what was possible (*e.g.*, "Among some applications—of halogenation—mention may be made of methyl chloride . . . methylene chloride and chloroform . . . dichlorodifluoromethane . . . etc.) but no information as to the operating technique. This information is probably not available—one does not give away such things to potential competitors. The Americans are getting a long lead in the organic chemical industry and the more we delay setting up a parallel industry in this country, the longer will their lead become.

Another thing that we are losing is the power to build petroleum refineries. Chemical engineering plant can be, and should be, one of our most valuable exports. Petroleum refining, cracking, and so forth, is a branch of chemical engineering. After the war huge refinery plants will be needed all over the world. The position to-day is that only America possesses any real and up-to-date knowledge of this part of the art; only firms that can arrange to work closely with constructional firms in the U.S.A. have any chance of designing petroleum-treatment plants. That was the way in which we lost the dyestuffs industry; the coke-oven building industry; the glass industry; and the chemical plant industry. Some of these we have recovered; some we are trying to recover. Unless our chemical engineering firms are given the opportunity to acquire that knowledge, we shall play second fiddle after the war in chemical engineering to Germany and the U.S.A. It is for the Government to decide. Shall we embark on this venture; or shall we leave it to other nations?

NOTES AND COMMENTS

Argument on Patents

THERE appears to be in existence a sort of popular superstition that the "big" firms—not only in the chemical industry, but in every other—always pull together for their own benefit and to the detriment of everybody else. This must be managed, we suppose, by a kind of clandestine industrial super-Cabinet, in which the big chiefs get together and plan out their nefarious policies for the next year or so—an idea which strikes us, frankly, as somewhat celluloid. We do not contend that the big industrial combines have come into being for the good of their health; but we do think that they are actuated by reasonable business motives; and during the development of the industrial era it has been fully demonstrated that it is seldom good business to "grind the faces of the poor," or of anybody else. As was revealed in our pages recently, Lord McGowan can show that I.C.I., whatever its faults, has proved to be an irreplaceable national asset, and has worked incalculable good for thousands. This week it is demonstrated that I.C.I. and Boots, two concerns that can surely claim to represent "big business" in the chemical line, can take diametrically opposite views on a question of scientific politics—the problem of Patent Law. We have quoted, further on in these pages, from the two publications which these firms have severally issued, and it will at once be seen that much thought has been given to the problem. The fact that the resultant decisions are very far from agreeing should assist in dispelling the phantasm of a secret collective power behind the scenes of industry.

Suppressing Information

ONE way or another, the Government, or, more precisely, the departmental understrappers who are set in authority over us nowadays, seem determined to restrict as far as possible the circulation of scientific information. We have now heard of a method, simpler and even more effective than the censorship, for calling a halt on publication—the refusal to supply a scientific institution with the paper on which to print its proceedings. The Plastics Group of the Society of Chemical Industry, while resolving to

charge an annual subscription for membership, have been obliged to fix this subscription as low as 2s. 6d. per annum, because there is at present no question of permitting the circulation of their printed proceedings. "It is unfortunate," says the memorandum of the Group, "that the Paper Control will *no longer* allow reprints of lectures to be published." The implication is that the Paper Controller has, after much thought, exercised his discretion against the continuance of the Group's publications. It is difficult to reconcile this with the statement of the Minister of Supply, made in Parliament in the early days of paper control, that he was unable to exercise discrimination for or against any particular kind of publication, in reply to a suggestion that, considering the awkward paper situation, it was remarkable how much trash was still being published. It now appears that rubbishy novels and worthless magazines can still be turned out in their thousands; but there can be no allowance for the comparatively restricted circulation of a learned society's publications.

Dumb Obstacity

THE "double-action" system of censorship of technical news which appears to be in force in this country is once again spreading doubt, with its accompanying spectres of alarm and despondency. This time it is the subject of penicillin which is being invested in an atmosphere of "hush-hush." It is reasonable enough that the technical press should be asked not to reveal all the details of its preparation; but it is by no means reasonable to refuse an official statement about the efficiency of the arrangements for producing this valuable drug in requisite quantity. The opponents of "big business," of course, immediately jump to the conclusion that another monopoly, or semi-monopoly, is being created. Last week, in Parliament, Mr. Robertson asked a question about penicillin production, but framed it in so unfortunate a way that the Minister of Supply was able to deny him an answer on the ground of "public interest." All we would ask for is the publication of a list of British manufacturers of penicillin; a corresponding list

(with additions from time to time) was published weeks ago in America, and the inevitable impression is created that the Americans once again have got ahead of us in the development of an essential commodity.

Penicillin Critics Answered

SINCE the above was written some information has come to hand, not from Government sources, but from the Therapeutic Research Corporation, who have felt obliged to issue a statement "to correct a great deal of inaccurate information which appears to be current on the subject" of the development and production of penicillin. After making due acknowledgment to Professor Fleming and Professor Florey, they catalogue the firms who have been co-operating in the research leading up to the large-scale production of the drug. These include the firms within the corporation: Boots, B.D.H., May & Baker, Glaxo, and the Wellcome Laboratories; also I.C.I. (Pharmaceuticals), and Kemball, Bishop & Co. Academic workers who have collaborated include Sir Robert Robinson, Professor Heilbron, and Professor Raistrick. The activities of the undertakings concerned are co-ordinated in the General Penicillin Committee of the Ministry of Supply. Mr. Robertson may describe this effort as "a monopoly" if he chooses: we feel bound to differ. And we are satisfied that, if there is any delay in the production of penicillin, it is due not to inertia but to the fact that, with the biological and non-chemical methods of manufacture imposed by the stage of development so far reached, there can be no absolute certainty that each batch will be of the same standard activity.

Magnesium Muddle

ASOMEWHAT confused state of affairs, to put it mildly, is disclosed in the Second Report from the Select Committee on National Expenditure, 1943-44 (H.M.S.O., 4d.), which deals with the production of magnesium and magnesia, and one result of adopting the Committee's recommendations for closing redundant factories will be the writing-off of public expenditure to the tune of some £2,500,000. It appears that there are four firms producing magnesium in this country, modestly disguised in the Report as Firms "A," "B," "C," and

"D." Details of the various processes operated are given in the Report, and the variation in the cost of the product is particularly interesting. Firm A turns out magnesium in its own factory at 3s. 10d. per lb., and in a shadow factory at 4s. 3d. per lb. Firm B can produce the metal at 1s. 7d. per lb. Firm C reports an average cost of 3s. 8d. per lb., while Firm D hopes to achieve a figure as low as 1s. 6d. per lb. when it can operate its process on a regular production basis. The Report traces the history of magnesium production in this country since 1935, when we first ceased to be entirely dependent on the imported material, and a remarkable picture of vacillation is revealed.

Redundant Factories

ONE factory, for example, worked by Firm B, was first extended by Government authorisation, then threatened with complete closure, reprieved and put on a reduced output, and finally, on the outbreak of war, ordered to work at full capacity. Next, when it became apparent that yet more magnesium was required, three new factories were set up, but two of them were almost immediately transferred to Firms A and C. Increasing Canadian and American capacity altered the picture, and the final blow came when research and development reduced the quantity of magnesium needed in incendiary bombs. Coupled with over-production in America, this caused many of the factories to become redundant. Indeed, one factory of Firm C, which did not reach full production until December, 1943, was already redundant in February, 1944. As the Committee says, it should never have been built on its present scale. Much the same confusion exists in the production of magnesia, where Firm E produced the material at £12 14s. 6d. per ton, and Firm F at £24 12s. 3d. per ton, yet a plant was rushed up to operate the more expensive process before its problems of development had been solved. In both departments the Ministries concerned are to blame for expending public money on erecting plant for undeveloped processes instead of employing experts to develop the processes to an economic pitch. Small wonder that we are short of development chemical engineers, when there is so much reluctance to make use of their services!

Compulsory Patent Licences

The Case For and Against

PATENT law is a matter of considerable public importance at this stage of history. It is not, however, a subject on which the public is particularly well-informed, nor indeed is it one in which the public takes a very keen interest. Though everyone is dependent upon things that are the product of discovery and invention, little notice is taken of what is patented and how it is patented until some flaw in the patent system has revealed itself, and a product has become either unobtainable, or obtainable only at a price that appears exorbitant. From time to time existing patent legislation comes in for well-informed criticism, and two interesting contributions to the discussion have been published recently.

Two Pamphlets

The first, a pamphlet entitled "Patents and Licences of Right" has been compiled by Mr. E. H. Bingen, solicitor to I.C.I., Ltd. The other is a memorandum written by Mr. A. Sugden, secretary of Boots Pure Drug Co., Ltd., on "The Patents System—Patents and Licences of Right." They present points of view that are diametrically opposed. The Boots pamphlet makes a forceful plea for drastic changes in our Patent Law with a view to the abolition of monopoly of manufacture under a patent, and advocates the adoption of a compulsory system of licences to manufacture. The I.C.I. document sets out the case for the continuance of the present system. Summaries of the two sets of arguments are printed below, and we invite our readers to take the opportunity of continuing the discussion in our columns.

Mr. Bingen contends that, of all the proposals to change the patent laws, compulsory licensing is probably the most dangerous to the effectiveness of the patent system for its intended purpose. Only if we are to go into a socialised control of all industrial activity and commerce would it be justified or necessary. Conceivably in such a state research could be done by publicly-financed laboratories, and losses due to unsuccessful commercial ventures absorbed by the public treasury. Until we reach that stage, the present exclusive rights conferred by a patent, with the protection which the British Patent Law at present imposes against those anti-social practices which come within the definition of "abuse of monopoly right," should in the national interest be retained.

There is, writes Mr. Bingen, a school of thought in this country which holds that "so long as research, experiment and inventive genius are encouraged and financed by

a reasonable system of royalties, it is contrary to the public interest to permit any monopoly of manufacture, and that any firm competent to manufacture should be granted a licence to do so."

Inasmuch as the grant of a patent confers on the patentee the exclusive right of manufacturing and selling the patented product or using the patented process for a term of 16 years, it may be asked how far the second objective for which patents are granted, namely, securing that new inventions shall so far as possible be worked on a commercial scale in the U.K. without undue delay, is secured by any express provision in the Patents Act. The answer is that the present law on the subject of compulsory licences or licences of right (whichever term is preferred) is to be found in Sections 24, 27 and 38a of the Patents Act.

Section 24 merely provides that the Comptroller shall, if the patentee so requests, cause his patent to be endorsed with the words "Licences of Right." This means that any person is entitled, as of right, to a licence under the patent on such terms as in default of agreement may be settled by the Comptroller.

Section 27

Section 27 is the key section. Its first clause provides that any person interested may, after the expiration of three years from the date of sealing a patent, apply to the Comptroller, alleging that there has been an abuse of the monopoly rights under that patent, and asking for relief. Clause 2 enumerates the circumstances in which the monopoly rights under a patent are deemed to have been abused. Clause 3 gives Comptroller the right, on being satisfied that a case of abuse of monopoly rights has been established, (a) to order the patent to be endorsed with the words "Licences of Right"; (b) to order the grant to the applicant of a licence on such terms as he may think expedient.

Section 38a is the well-known section applying to the preparation or production of food or medicine.

Mr. Bingen remarks that these are considerable safeguards and, in truth, the position is that a patent monopoly remains a monopoly only so long as it is not abused by the patentee (be he inventor or manufacturer). It may be argued that Section 27 would be improved if the acts or circumstances cited as "abuses of monopoly rights" were broadened in scope. The section is, however, already widely drawn, and any criticism should be directed to the

way in which the Court has interpreted the second clause of the Section.

Thus, in an application by the Brownie Wireless Co., Ltd., for a compulsory licence under one of the Marconi Co.'s valve patents, Mr. Justice Luxmoore said: "If a patent is in fact being worked in such a way that the public demand is being supplied to an adequate extent and on reasonable terms, no one can complain, and public interest does not in such circumstances require that a particular manufacturer who desires to manufacture and sell the patented article should be granted a licence to do so. Indeed, the public interest may itself require that the number of licences shall be limited, because it may well be that the public interest is best served by ensuring a steady supply of the patented article by preventing the flooding of the market, and a drastic reduction of price by wholesale competition."

If, in fact, the court's views of "the public interest" are at variance with modern economic theory, it is for those who take that view to persuade the courts that they have been acting on wrong principles, rather than to request a change in the statute which already takes account of the public interest. There seems in addition, states Mr. Bingen, to be a widespread impression that Section 27 is cumbersome or inoperative, but there have been many cases both before the Comptroller and before the Courts in which applications for compulsory licences or for revocation of patents have been made. The mere fact that there are not more reported cases supports the view that the mere existence of the section is such a deterrent to those minded to abuse their monopoly rights that the threat alone of an application to the court is in appropriate circumstances sufficient to produce any licence that may be desired.

What is "Public Interest" ?

Mr. Sugden replies to the foregoing arguments as follows. He maintains that while, obviously, the legal position has to be explained, and so far as possible understood, the problem is clearly not a legal one. He suggests that in dealing with the court's interpretation of public interest, Mr. Bingen's dictum is surely unacceptable, namely, that those who are at variance with the court's views should endeavour to persuade His Majesty's Judges to alter such views—rather than seek a change in the law itself. It is clear, argues Mr. Sugden, that over a long period of years during which the patent monopoly has existed, abuses of many kinds have taken place. It was a recognition of that fact that led to the formulation of Section 27. This section indicates the types of abuse and the remedies to be applied; one of the remedies is the compulsory endorsement "Licences of

Right"—thus establishing the principle of its suitability as a remedy. Before examining the primary question as to whether the law as it stands has provided, and does in practice still provide, adequate safeguards, Mr. Sugden explains that Section 38a deals with a particular type of patent, *viz.* those covering inventions relating to foods and medicines. He adds that there may well be a wide divergence of opinion as to whether these in principle call for special treatment. Should, however, this be so, the section has in fact proved of little practical value and use despite what appears "on paper" to be the grant of wide powers to the Comptroller to grant licences. In the exceedingly few cases which have been decided, the tendency has been to apply the same tests as under Section 27, and it merely affords proof of the contention that nothing short of a compulsory licensing system will in practice be effective.

Cumbersome Procedure

Mr. Sugden questions whether the mischiefs are adequately safeguarded, because Section 27 which deals with abuses is drawn so widely and with such elasticity as to bring everything with the net, and whether the procedure is not unduly cumbersome and therefore inoperative. He proceeds: It is said that the procedure has been operated in some thirty cases which have been brought before the courts, and is therefore suitable, and that if on the other hand this appears to be a small number of cases, the reason is that the principles which guide the Courts are so well understood that the section by its mere existence acts as a sufficient deterrent against abuse. To deal with these points: firstly, it is interesting to note that the records of the Patent Office show only some six or seven successful applications. As the above statements are mere generalisations, it is necessary to examine the actual facts. This can be done quite shortly, and, it is thought, effectively. As to the procedure in actual practice: Mr. Bingen referred to the case of Brownie Wireless Co., Ltd., which incidentally resulted in the refusal of a licence. This case occupied the Comptroller some three days and the Court of Chancery nine days covering a period of 1½ years between the application for a licence and the finding of the Chancery Court—in the latter Court three leading counsel and three junior counsel were engaged.

Mr. Sugden quotes another case—that of the application for a licence by McKechnie Bros., Ltd. That occupied the Comptroller on ten separate days and the Court of Chancery nine days, again engaging the services of three leading and three junior counsel. The case, incidentally, showed that the patentees, the German I.G., although not working the patent here, refused a licence

to the applicants on the ground that they were in the act of negotiating an agreement for a licence to another company here. That agreement was held not to be *bona fide*, but it took the applicants over 1½ years to establish their claim by aid of long and expensive proceedings, during which time the I.G. were effectively holding up the matter for their own benefit. "So much for the type of procedure upon which comment as to its availability to any but the large concerns is unnecessary," remarks Mr. Sugden.

Mr. Sugden next deals with the generalisation that the principles of the Court's interpretation are widely understood. He considers that, in fact, an examination of the cases shows the direct opposite, the Court having again and again pointed out that a decision rests upon the particular circumstances of each case. It is sufficient to refer merely to Mr. Justice Luxmoore, who, during the hearing of one particular case in which, as usual, all sorts of points were raised in opposition, said (to quote his words): "the first controversial point to be determined is . . ." thus establishing as a fact a degree of uncertainty which, in itself, in practice renders the section of questionable value.

The I.G. "World Plan"

Mr. Sugden suggests that it is curious that the opponents of the new proposals have not, at any rate up to the present, made specific denials of real abuses of the present system, their case appearing to be that the present system is framed to avoid them; that it provides a reasonable and adequate measure of safeguard and procedure, and consequently by inference these abuses do not or should not exist. Furthermore, it is broadly said that the three interests of the inventor, manufacturer, and public would suffer if a compulsory system were to be introduced. But, says Mr. Sugden, the question of abuse must be considered in the cold light of actual experience. "There is, no doubt, much further information yet to come, but upon the facts as we know them at present it is indisputable that the world plan of the German I.G. was conceived and brought into being by the protection obtained in all parts of the world through patents and trade marks by the use of each country's legislation guided by legal experts of these countries," comments Mr. Sugden.

"Practically every conceivable industry was covered—dyestuffs, chemicals, explosives, plastics, synthetic rubber, petrol, etc. Many vital and important products were not made at all in this country owing to the existence of these patents which not only prevented their manufacture but also hampered research in the wide fields covered by the patents. Special emergency legislation had to be provided at the outbreak of war

to enable automatic licences to be obtained and to start manufacture from scratch, with its serious attendant difficulties and delays. If the necessary steps be not taken to prevent it, we shall find a continuance of the same state of affairs after the war. The I.G. will be able to proceed with large numbers of patent applications at present lying dormant, as well as new applications for not only their own war-time inventions but for those which they have obtained from countries occupied by them. It would be a fallacy to come to the conclusion that the evil could be prevented by applying the principle of compulsory licences merely to foreign patentees, because this could be got round at once by the setting up of associated or nominee companies here, which in their turn could use the present system—many such companies already exist. No system should continue which aids or permits the working of arrangements and agreements for the elimination of competition, the dictatorial assignment of exclusive marketing areas, and the exchange of exclusive licences."

The Small Manufacturer

The idea of making all patents subject to a compulsory licensing is thoroughly discussed by Mr. Bingen, who starts by examining how manufacturers would be affected if all patents were endorsed "Licences of Right." He points out that unless the manufacturer can foresee with some certainty a reasonable return on his outlay he will in many cases not commence manufacture. This consideration applies with particular force to the small manufacturer. Under a compulsory licensing law a large competitor could obtain a licence and, because of his greater resources, undersell the small manufacturer who had developed the product. The exclusive nature of the patent grant does not always abolish competition. It may well drive the competitor to find an alternative not covered by the claims of the patent, thereby fostering invention and research for alternatives. If the grant of a patent conferred no monopoly rights, there would be very little incentive to research whatever, for a great number of concerns would see no cause for carrying out a long and expensive research programme if they were always assured of a licence under any inventions made by others.

If exclusivity were abolished, continues Mr. Bingen, a manufacturer would no longer have an opportunity of advancing a step beyond his competitors, and the incentive to take up new inventions would practically vanish. Only those comparatively rare inventions which are so obviously attractive that they would, as it were, sell themselves on sight would reach the market. In such cases there would inevitably be a

number of licensees, so that production would take place in relatively small units and consequently with high manufacturing costs even in the most efficient plants. Faced with the prospect of price-cutting competition and an ultimate total loss of their investment by the less inefficient licensees, there would inevitably be some reluctance on the part of manufacturers to take up even what appeared an obviously attractive process. Since only a small proportion of the inventions patented result in successful manufacture on a commercial scale, the few inventions brought to a successful conclusion must eventually pay for the much larger proportion which do not materialise. It is difficult to see how this could be achieved by a system of royalties.

One of the first results of a compulsory licensing system would be that competitive manufacturers would only apply for licences after the original firm had done all the work necessary to develop the invention and to put it on the market and prove its commercial success. The risk of this happening would inevitably result in a diminution, if not in research, at any rate in patenting. The money available for research would become more and more limited if in future any return on investments in research and development had to be obtained from profits on a limited output, together with royalties from non-exclusive licences granted to other manufacturers, instead of from the profit for a period on the manufacture of the full market requirements.

The very important contributions to industrial progress made by organised research departments of large manufacturing companies might no longer be patented if the grant of a patent made those contributions immediately available by compulsory licences to competitors. Even in present circumstances the manufacturing company must often consider seriously whether it would not be better to secure an unlimited, though indefinite, period of monopoly by secret working rather than give away the invention in return for the limited sixteen years of exclusivity, hedged round as it is by the safeguards already mentioned.

The Individual Inventor

Mr. Bingen maintains that the inventor would also suffer. The best chance the individual inventor has now of securing an adequate reward is by selling his invention to one concern prepared not only to pay him a substantial amount either as a lump sum or by way of royalties, but also to expend a very considerable amount of money in development and introducing the invention to the public. Under a system where all licences were non-exclusive, most concerns would be unwilling to undertake the risk.

The public, concludes Mr. Bingen, would be worse off than now. A large num-

ber of inventions would never reach the public, since there would be insufficient inducement for the manufacturer to market them. If licences were to be had for the asking, there would be a sort of tortoise race between manufacturers to avoid being first; for the first licensee would have to bear the burden of creating the public demand for the product, and later licensees would reap the benefit of his publicity campaigns. Other inventions would be sold as secret processes.

A Negotiable Asset

Mr. Sugden argues that, although endorsement of the patent "Licences of Right" throws open the manufacturing rights, it does, on the other hand, present the patentee during the life of a successful patent with a negotiable asset of a value based upon assessment of present and future royalties on a wider basis. The inventor, however, may well be satisfied to rely by way of income return on the broader basis of royalty earning. As to the argument that he may choose to retain his invention as a secret process, it would be obviously useless to him unless he himself manufactures, and it is unnecessary to point out the difficulties of selling a secret process as such without incurring the danger of disclosure.

The general statement that the public would suffer by a compulsory system of licences requires examination, continues Mr. Sugden. During the hearing of applications for licences the Courts have stressed the importance of the public interest. This, however, is "the public interest" as presented by a particular manufacturer in order to obtain a licence in a particular case. The public, as such, has no *locus standi* in the protection of its interests, but in any event it is doubtful whether it is the true function of the law to pronounce upon what must be purely economic questions. Accordingly, the suggestion that those manufacturers who are not satisfied with the Courts' interpretation of public interests should endeavour to persuade the Courts to alter their views, cannot make any serious appeal. The facts before referred to as the I.G. activities and the existence of the types of agreement and arrangement permitted under the present system, speak for themselves and suggest a state of affairs not "to the public interest" but an actual danger thereto.

The argument that the public interest will suffer because secret processes may be resorted to must be special pleading, it being applicable only to process patents which by their nature could be kept secret. Even in such cases the attendant risks are so great as to render the practice most improbable, and in any event incomparable in effect with the present permitted abuses. The best service to the community must be the

broadening of the basis of manufacturing opportunity.

That due recognition must of course be given to the manufacturer through whose assistance the inventive idea is developed and made available to the public on a commercial scale is acknowledged by Mr. Sugden, who adds that this assistance may not always be appreciated by the public themselves. Mr. Sugden does not agree that automatically the small manufacturer cannot produce as efficiently as the large one and consequently will be undersold by the latter, nor does he concede that the big companies would close, or seriously reduce, their research departments with the benefits and prestige resulting therefrom.

Advantages of "Compulsion"

Under a compulsory licensing system, suggests Mr. Sugden, the inventor and his manufacturer would still have the substantial advantage in that they could have two years' start over anyone else during the period between his application for the patent and its actual grant. Furthermore, some substantial time would inevitably elapse before any licensee could get his product on to the market, and it would therefore appear neither unfair to the original manufacturer nor contrary to the public interest that after this period of time there should be competition. Little value appears to be attached to being the originator with the right of marketing as such, and applying one's own name or trade mark. It is not understood why the tortoise race before referred to would apply to patented articles because it certainly does not so work out in practice as to non-patented products. Eagerness to produce new and improved types of such merchandise and to be the first on the market, with the expenditure of considerable sums of money to achieve this object, would appear strongly to negative the argument.

The conclusion Mr. Sugden draws is that the broadening of manufacturing opportunity must be the real concern. In practice at present, and until the present system is changed, it is the manufacturing interest which dictates the amount of production, and, in the absence of competition, largely determines the price. By the adoption of automatic licences production would be controlled by public demand and prices fixed accordingly. The efficient manufacturer with his research behind him would always hold his own in a competitive market, maintaining and improving his own standards because of such competition. In sum, he contends that the present system is quite inadequate to meet the serious actual abuses; that the procedure is impracticable and unsuitable; and that the adoption of a compulsory licensing system would appear to be a great step in advance.

The Future of South Wales

Catchphrases and Reality

POPULAR phrases and catchwords on industrial planning and research are not enough. That was the keynote of the presidential address which was given to the South Wales Institute of Engineers last week at Cardiff by Dr. F. J. North, head of the Department of Geology, National Museum of Wales. Referring to an outline of an industrial future for South Wales drawn up by Colonel W. C. Devereux, of International Alloys, Ltd., and published in *THE CHEMICAL AGE* on August 21, 1943, Dr. North said that the magnesium proposition in the outline seemed promising, but he added that processes developed under war-time conditions would not automatically fit into peace-time economy. Before that became possible a great deal of successful work directed towards reducing costs of production would be necessary, and unless new uses were found for the metal peace-time requirements would not absorb the present output.

Pooling Resources

It would, he said, take more than a hopeful intimation that South Wales ought to have plastics industries to bring such industries into being. One important group of plastics depended upon phenol and certain kinds of cresols which are obtained from coal tar, but the output of those materials from the gasworks and coke-ovens of South Wales would be sufficient to supply only a very small plastics factory. If the resources of several coalfields were to be pooled, a locality already making plastics, or one with a tradition for chemical industry, would have a great initial advantage. To the technical problems of production must be added those arising from the competition for raw materials between the various by-product-consuming industries, so that only wide vision and vigorous action conceived in a spirit of collaboration would bring plastics industries to South Wales. It was because so many processes were not at present economic that it was useless to think of them as potential new industries in the near future.

Complex as were the problems of South Wales, went on Dr. North, the one common factor was coal. The first step was to make the nation realise to what extent its welfare depended upon coal, upon those who made it available for use, and upon those whose efforts were directed towards discovering how best to use it. The great concentration of coal in South Wales made it inevitable that its industries must be considered in terms of that substance. In the long run it would be the wise utilisation of coal at home that would count, and now was the time to make plans towards that end.

Parliamentary Topics

Storm over Penicillin

THE Ministerial black-out with regard to facts about penicillin production was last week extended to the House of Commons, where indignant M.P.s questioned the right of the Ministry of Supply's spokesman, Mr. Peat, to refuse to answer any part of two questions put to him by Mr. Robertson. This member had asked what new buildings the Minister of Supply had authorised for penicillin production, and what were their extent, cost, completion dates, occupiers and owners; also, what existing buildings had been authorised for production and for whom the premises had been requisitioned.

At the end of question-time Mr. A. Bevin, who had earlier accused Mr. Peat of hiding behind the ministerial formula that disclosure of facts is "not in the public interest," asked for protection of the Speaker against the Government's abuse of this formula to conceal from M.P.s information to which they were entitled. Several other M.P.s entered into the discussion, and elicited from the Speaker the admission that he had to accept the Minister's words just like any other member, adding that the matter could be raised on the adjournment. Mr. Peat then attempted to explain his evasion of the questions by saying that a full answer would have given the enemy information about the position and scope of penicillin production. He argued that penicillin was as vital as the most secret weapon, and detailed information would lay British production open to air attack. He did not, however, offer any explanation of his refusal to answer any part of the question.

Another question about penicillin came from Sir H. Williams, who asked the Minister of Supply the names of the experts who were now in the United States studying the production of penicillin, and by what firms were they employed. Mr. Peat said the technical experts referred to were Dr. W. R. Boon and Mr. Harry Jephcott, who had been sent to America as representatives of the Penicillin Committee of the Ministry of Supply. Their services had been made available to that committee by Imperial Chemical Industries and Glaxo, Ltd., respectively.

Mr. Robertson then asked for the number of manufacturing chemists producing penicillin, and for their names.—Mr. Peat: It would not be in the public interest to publish the other information asked for.

Underground Gasification

Mr. Wootton-Davies asked the Minister of Fuel and Power whether underground gasification was being at present studied in any British coal mines, and whether investi-

gation was being made of this development in Russian coal mines. Major Lloyd George answered the first part of the question in the negative, and added that he had so far received no detailed information about the Russian work.

Bauxite in Jamaica

In answer to a question put by Mr. Riley, Mr. Emrys-Evans, for the Secretary of State, said it had been decided that the Jamaica bauxite deposits, not being available immediately, could not make a contribution to war needs. Post-war development was being considered, but he could not yet make a statement. Mr. Riley then asked if the Minister was aware that already there was a movement by American companies to consider the exploitation of Jamaica's bauxite. Mr. Emrys-Evans replied that the Colonial Office was watching events.

Substitute Fuels

A question was asked by Mr. A. Edwards about the extent to which substitute fuels were being used. Mr. Noel Baker regretted that no information was at hand to show the quantity of each fuel being used. He said complaints about fumes from producer-gas vehicles were being investigated. The number of vehicles running on particular fuels was as follows: producer gas, 2477; coal gas, 1438; methane, 109; butane, 12; creosote, 1796.

Use of Methane

Mr. R. Morgan asked the Minister of Fuel and Power whether the use of coal-produced methane gas was being considered on practical lines. Major Lloyd George replied that every known source of methane had been examined on merits, but in very few cases did the quantity available justify the expenditure during war-time of the labour and material necessary to bring it into use. An experimental boring was now in progress to ascertain if methane could be produced in quantity from coal seams.

Copper Imports

Sir H. Williams asked the Minister of Supply whether the reduction of imports of copper from Rhodesia has been accompanied by an equal reduction of imports from other sources of supply. The Joint Parliamentary Secretary to the Ministry of Supply (Mr. Peat) replied that the proposed reduction of Northern Rhodesian copper production would not begin to take effect until April, and would not enter fully into effect until June. It would not materially affect imports into the United Kingdom until some months after. The question of the adjustment of production in and importation from other sources of supply was being taken up through the appropriate Combined Board machinery.

SAFETY FIRST**Fire Risks and Post-War Industry—I**

by JOHN CREEVEY

FEW industries, if any, are free from the risk of an outbreak of fire—this is true even when war-time risks are left entirely out of the question. In view of post-war developments, the building of new works and rebuilding of those which have suffered war damage, we must not overlook the continued need for attention to fire and its prevention. In this connection a review of the fire risks existing in individual industries should be put in hand as early as possible by every technical society that is concerned with the welfare of its particular industry. It is important that recommendations should be formulated for the consideration of those who will be engaged in new building and rebuilding, and with the establishment of the new industries that are likely to arise.

Reading back twenty years or so into the literature is often wisely done for subjects apart from fire prevention, because in the multifarious and sometimes rapid developments which have taken place in certain industries, we are apt to forget some of the things which are so fundamental. It was in March, 1927, that A. M. Cameron gave a lecture on "Fire Risks in Industry," at a joint meeting of the Edinburgh sections of the Institute of Chemistry and the Society of Chemical Industry. This lecture was subsequently printed as a publication of the Institute of Chemistry, and though it is now nearly seventeen years old, much of the subject matter may be read again to recall the manner in which some fires have started.

Direct Ignition

The lecture mentioned, tells us something about the direct ignition of materials, spontaneous combustion, improper storage conditions, static electricity, the ignition of inflammable vapours, fire hazard from dusts; and risks which attend exposure to the heat of the sun. Under the heading of spontaneous combustion, we are reminded that the fibrous materials are hazardous because of the very large air-spaces they contain, and that piles of textiles a few feet in height will retain heat for hours, with only a very slow drop in temperature. This fact should be remembered where quantities of empty sacks are awaiting collection or re-use and especially where such sacks have become oily or otherwise impregnated with hazardous material. The high proportion of air-space accelerates the oxidation of oils of the "drying" type. Where there is a residue of certain powdery materials in the sacks, the friction caused by transport and handling can be sufficient to ignite the sacks under conditions such as those that occur in an ill-ventilated space or where the air currents assist the first burst of flame.

What has been said of sacks, may also be said of straw and similar packing materials. Although a non-combustible material like slag-wool is often used to pack crated glass carboys, there is still a considerable amount of straw employed, despite the fact that dry straw will ignite in less than three-quarters of an hour, if it has contact with strong nitric acid (sp. gr. 1.30 to 1.38). Within the last three months, the writer has seen a lorry pulled up at the roadside so that the driver could remove a carboy which had its straw packing saturated by spillage of acid (apparently the lorry had skidded), and it was noticed that the straw did not take long to burst into flame.

Static Electricity

Static electricity can be developed by solid friction, as well as by pumping or by the discharge of a liquid through an orifice. Leather or composition belts, running with wooden pulleys, are not an infrequent cause, and though it may be desirable (and is sometimes very necessary) to effect discharge of the current by means of an earthed metal comb in contact with the belt, such a device is still not adopted in many cases where there is evidence of "sparks" occurring from time to time: that a serious static charge does not build up in such instances is due only to some unintentional defect which causes earthing. As regards the pumping of inflammable liquids, it has been found that the passage of petrol through a metal pipe, at a velocity of 25 feet per second, may cause a discernible spark after pumping for 30 to 60 seconds.

Where there exists an atmosphere containing combustible dust, special precautions must be taken to prevent bearings becoming overheated. Many dust explosions in starch and flour mills have been traced to hot bearings, and here, apart from the ignition of the dust causing the explosion, it is also the dust which primarily caused the hot bearing. Dust soon settles on oily bushes; it finds its way into oil-cups and so passes into the bearing, which heats up by the resulting friction and in time becomes hot enough to cause the mixture of oil and dust to "char" and burst into flame; the flame leads to an explosion if the amount of dust in the atmosphere is sufficiently high. To detect overheated bearings, it is possible to use a sensitive paint which changes colour when the temperature rises above a certain point. This paint is made by grinding one part of cuprous iodide with two parts of mercuric iodide, and mixing with sufficient spirit varnish. When applied to the exterior surface of the bearing, this paint remains bright red up to temperatures in the neighbourhood of 130° F., but becomes

darker as the temperature rises, until at 220° F. it is almost black; as the surface cools, the paint resumes its normal colour.

Exposure to the rays of the sun can be more serious than is often imagined. In the case of glass containers there is normally a risk of bursting, through the accumulated heat causing internal pressure; it is only necessary to stand a bottle of strong aqueous ammonia in the sun for a few seconds to observe the jumping of the glass stopper. Once upon a time a student did this very thing unwittingly—the stopper was tight and the internal gas pressure exceeded the strength of the bottle at the moment another student came to pick it up!

Steel tanks for storing petroleum products are painted externally with aluminium paint to reflect the heat rays of the sun. Yet at one particular works, the sheds used for the storage of cylinders of compressed gases were noticed to be painted black. This colour was applied year after year and it seems that good fortune alone prevented an explosion. Sun temperature in this country is not as high as in many other parts of the world, but certain precautions against it are certainly desirable here.

At chemical and allied works, construction should be as nearly fireproof as it is economically

possible to make it, and all hazardous processes (which may lead to fire or explosion) should be isolated within separate areas. The plan adopted, will, of course, depend upon the site, and has to be modified to suit conditions; on this point something more will be said in a later article. Processes that are especially hazardous need to be properly safeguarded, and any hazard that can be eliminated, without affecting the process, should certainly be cut out. In addition, ample fire-fighting equipment must be provided.

If costs are high, there must be co-operation between adjacent works, for the menace of an outbreak of fire which is not under control, becomes a concern to adjoining works. Money spent out of profits for the provision of better safeguards against fire, for industries with particular fire risks, should have due allowance made in the matter of taxation. As long as two hundred years ago the authorities in certain towns in this country were wiser than we are to-day, for where buildings in a town were especially subject to risk of fire, the provision of "water buckets, fire hooks and poles" by individuals at their own cost, gained a rebate in the rates paid to "poor and church."

Petroleum Refining

Basin for a New Chemical Industry

DEVELOPING a thesis which he has outlined on more than one occasion in the pages of *THE CHEMICAL AGE*, Dr. F. Kind constructed a powerful case for the establishment of a major petroleum-refining industry in this country when he addressed the Manchester section of the Society of Chemical Industry and the Institute of Petroleum on February 4.

Beginning with a review of the technical progress made in the oil-refining industry, Dr. Kind spoke of the creation of a new organic chemical industry which in its first few years had left the "classical" chemical industry far behind. He described the rich gases formed by modern refinery processes as "almost more valuable" than the motor spirit for the plants were originally designed. These were the materials for synthesising special hydrocarbons. "If," he said, "we have entered the Chemical Age, these synthetic materials must be produced on a scale comparable with timber, cotton, steel, cement, etc."

The bulk of the raw material must come from petroleum, though coal carbonisation, fermentation, and all other processes must be used as well. He pointed out that it is the by-products of coal, not coal itself, that are of use to the chemical industry; similarly, only petroleum refining, not the crude oil itself, provides the requisite raw materials. Refinery products, however, were gaseous, he reminded his audience,

and did not lend themselves to economical transport, as did the by-products of coal. The existence of a large modern and progressive refinery industry on the spot was therefore essential to the development of the new chemical industry.

He hoped that the quantities of coal carbonised in this country would increase year by year, and simultaneously the quantities of benzol and tar. The Empire would also, he hoped, augment its production of starch and sugar, with the possibility of increasing the products of fermentation. "If," he went on, "these three main supplies of raw material for the organic chemical industry—coal carbonisation, fermentation, and petroleum refining (with calcium carbide)—should each develop their own subsidiary chemical industry, a clash of interests, to the disadvantage of the country and themselves, is to be feared. If, however, there is an independent and highly-developed chemical industry consisting of a number of efficient and specialised companies, an open market between the producers of chemical raw materials and these industries will develop and each raw material find its economic level and most useful outlet, quite apart from the fact that every chemical industry will probably require some of its raw materials from each of the groups."

Dr. Kind also stressed the importance of industrial training, declaring that two types of specialist were in particularly short supply: the development chemical engineer, and the chemist with a thorough economic and commercial training.

Seaweed Gums

Their Production and Use in America

AN interesting account of the production and use of seaweed gums in America is contributed by Mr. L. H. Ausman, Assistant Trade Commissioner, to *Commercial Intelligence Journal*, the organ of the Canadian Department of Trade and Commerce (1943, 69, 2080, p. 465). The author states that his information is based on a paper prepared by Mr. Victor B. Scheffer, of the U.S. Division of Fishing Industries. According to this technologist, colloidal substances, such as gums, mucilages, gels, geloses, or agars, with a total value of about \$3,000,000, are extracted annually in the United States from seaweeds or marine algae. In addition, imports of such gums up to the outbreak of war amounted to more than \$1,000,000. The seaweed industries of North America are geographically restricted by the natural distribution of certain species of algae. The areas at present being exploited are the New England coast and Southern California. The Mexican coast adjacent to California and the Maritime Provinces of Canada are also proven sources of commercial seaweeds. With the increased interest in domestic production, it is probable that by the end of the war species of seaweeds hitherto unworked will become of commercial importance.

Seaweed Gum Types

The seaweed gums most frequently referred to are algin, agar, and carrageenin. There is, however, considerable confusion in the terminology, and the trade names of certain gums are commonly applied in a semi-generic sense.

Certain species of kelp are the source of algin. On the Atlantic coast the kelp is harvested with a grapple hauled at a depth of 12 to 15 feet from a power boat, and to a lesser extent by hand-dragging or sickling from a dory. The season extends from June to December. On the Pacific coast the kelp is mowed by giant harvesters cutting 3 to 4 feet below the surface and carrying as much as 300 tons in a single load. Harvesting is carried out in calm weather throughout the year. By selective cutting of the beds a sustained yield is assured.

When the fresh kelp is cooked with soda ash, the alginic acid of the living cell is released as soluble sodium alginate. This is filtered from the cellulose residue and returned to an insoluble state by precipitation with acid or alcohol. The outstanding use of algin is reported to be as a stabiliser in the manufacture of ice cream, about 2½ lb. of algin being required to stabilise 300 gallons. This same gum also serves as

in finishing leather, waterproofing concrete, fireproofing wood and camouflage materials, treating boiler-water, for can-sealing compounds and water-base paints, and in the manufacture of dental impression materials.

Figures of the current rate of production of algin are not available for publication. In 1941, however, about \$1,500,000 worth of alginates were produced. These were in the form of alginate compounds selling as low as 5 cents a lb., as alginate pastes for water purification selling at about 7 cents a lb., and as pure algin selling at \$1 per lb. The present market value of algin is from \$1 to \$1.25 per lb. in barrel lots.

Agar-Agar

The agar of commerce is a mixture of the extractives of several seaweeds, and its chemical structure may vary with the source of the raw material. Up to the outbreak of war, almost the entire supply of agar (92 per cent. in 1941) was produced in the Orient. Sources are now being developed in California and Mexico. The agar weed has been gathered regularly on the American coast since 1919, and perhaps earlier, by Japanese and Americans engaged primarily in diving for abalones. Much of it was shipped to Japan for processing. Lesser amounts of weed have been taken in shallow water with long-handled rakes. The diver works in a complete suit, crawling over the rocks on his knees and pulling the weed off by hand. Under good working conditions a man can harvest 1000 wet lb. a day. Little or no weed is gathered during the winter season of rough weather, from about November to March. The weed is dried in the sun, baled, and delivered to the factory at a cost of \$300 to \$400 a ton. A crude gel is extracted by a simple process of boiling and filtering. The water and impurities are then removed by freezing.

Shortly after the outbreak of war with Japan, the United States War Production Board issued an order restricting the further use of agar to the preparation of bacteriological media. At that time only 18 per cent. of the agar used in the United States went into media, 82 per cent. being utilised in the manufacture of dental impression materials, laxatives, emulsifiers, and confections, for meat packing and other purposes. Manufacturers of these products have turned to substitutes for agar or have dropped out of business along with others whose activities have been similarly affected by the war.

It was recently reported in the press that a substitute for Japanese agar had been developed at the University of Wisconsin by

using a seaweed obtained on the New England coast. This material is probably akin to Irish moss.

In 1941 the domestic production of agar was 36,000 lb., valued at \$2.50 a lb., or a total of \$90,000. The price of Kobe No. 1 agar has risen sharply from a low cost of 46 cents in 1933 to \$3.50 a lb. in 1943.

Carrageenin

The name carrageenin is considered best to describe the extractive of carrageen or Irish moss (*Chondrus crispus*). The seaweed source of this gum grows in the cooler waters along the North Atlantic coast and appears to be abundant on the rocky shores of Massachusetts and Maine and the Maritime Provinces of Canada. It grows at moderate depths and is harvested from dories with lead-weighted rakes from 15 to 20 feet long. The season extends from about March 1 to October 1. A man can rake about 400 lb. of wet moss a day, worth about two cents a lb. on the dock. For a century Irish moss has been offered for sale on American markets in dried form, either whole or powdered, raw or bleached. In response to war-time demand, however, a number of firms are now selling the purified extractive, which is here referred to as

"carrageenin." Information is not available as to the commercial methods used in extracting carrageenin, but it may be prepared in the laboratory by boiling the seaweed in fresh water for three to five hours, filtering off the residue and drying the extractive on a water bath. Although its chemical nature has not been thoroughly explored, carrageenin is said to differ entirely from agar in the ease with which it is extracted by the use of cold water.

Carrageen is used in the United States as an agent in the suspension of cocoa particles in chocolate milk, as a clarifying agent for beverages, and as a suspending agent in a wide variety of foods, drugs, cosmetics, and industrial liquids. These uses are more fully described in *Commercial Intelligence Journal*, No. 2023 (November 7, 1942).

While it is estimated that Irish moss valued at over \$100,000 was produced in 1941, figures are not available as to the value of the carrageenin extracted therefrom. The present market value of this product in barrel lots is about \$1.65 per lb. It should be noted that this refers to the extracted gelose and not to the Irish moss in any form.

Sulphur Dioxide in Gelatine

Paisley Firm Fined

GELATINE which was found to contain 920 parts of sulphur dioxide in excess of the thousand parts per million permitted resulted in a group of firms being summoned at Burnley recently. Defendants were: Richard Yoxall & Sons, Ltd., Burnley; T. Sanders Smith, Bolton; Patent Phosphates & Merchandise, Ltd., Manchester; Fox, Roy & Co., Ltd., Plymouth; Stancourt, Sons & Muir, Ltd., London; and William Forrest & Sons (Paisley), Ltd. The first five firms relied on a warranty, and Forrest & Son accepted responsibility.

On behalf of Forrest & Son, it was stated that before the war gelatine in this country was chiefly made from imported sun-bleached bones. Makers of edible gelatine now had to be satisfied with more crude materials, namely, hides and fleshings from local tanneries, etc. These materials were subjected to a 0.5 solution of sulphur dioxide for 24 hours and submitted to other processes for the removal of impurities. By accident, some gelatine containing a small excess of sulphur dioxide was sent out, but did not come to their notice until October, 1943. Since then they had augmented their laboratory staff to increase the precautions.

Forrest & Son were fined £5 with prosecution costs of £15 15s. They were also directed to pay £17 17s. to Yoxalls, and £15 15s. each to the other defendants.

Dicalcium Phosphate

A Chlorophosphate Process

IN a paper presented to the American Chemical Society, Division of Fertiliser Chemistry, Mr. E. J. Fox and Mr. K. G. Clark, of the U.S. Department of Agriculture, recently described a process for making dicalcium phosphate, which would permit substantial economies in reagent material over methods currently employed.

Aqueous or gaseous hydrochloric acid may be used on phosphate rock in conjunction with phosphoric acid and/or sulphuric acid for the production of mono-calcium chlorophosphate free of calcium chloride. By ammoniation this latter may be converted into a mixture of dicalcium orthophosphate and ammonium chloride. Or, by a simple thermal treatment in the presence of water vapour, the hydrochloric acids may be recovered and the residue converted to dicalcium phosphate. The use of hydrochloric acid on phosphate rock without the addition of phosphoric acid yields an excess of calcium chloride which interferes with the conversion of the monocalcium chlorophosphate to dicalcium phosphate because it preferentially reacts with it to yield chlorospodisite— $\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CoCl}_2$. Thermal decomposition of the monocalcium chlorophosphate without the addition of water vapour proceeds in two steps, yielding, as the final product, unavailable calcium pyrophosphate.

Personal Notes

MR. J. G. PEARCE, director of the B.C.I.R.A., has been lecturing for the Ministry of Production on the design of castings to business executives, designers and engineers.

MR. ROBERT STUBBS, general manager and secretary of Lowmoor Best Yorkshire Iron, Ltd., for the last 14 years, has been appointed a director of the company. The Lowmoor Ironworks, which are controlled by Thos. W. Ward, Ltd., are among the oldest wrought-iron works in the country, dating back to 1791.

Obituary

MR. KENNETH SPENCE, a director of Peter Spence and Sons, Ltd., Manchester, Widnes, and London, died on February 10 at Cwmcarvon Court, Monmouthshire, aged 56.

MR. WILLIAM GRAY, who died in Edinburgh on February 11, aged 67, had been manager of the Pumpherton Oil Works, Midlothian, since 1922, and was a prominent figure in the Scottish shale oil industry.

Forthcoming Events

A general meeting of the **North of England Institute of Mining and Mechanical Engineers** will be held in the lecture theatre of the Institute, Newcastle, at 2 p.m. on **February 19**.

The **Royal Institute of Chemistry**, South Yorkshire section, is holding a discussion on "The Education and Training of Chemists," at 2.30 p.m., on **February 19**, in the premises of the Sheffield Metallurgical Association, 198 West Street, Sheffield.

The 26th annual general meeting of the **British Association of Chemists** will be held at the Café Royal, Regent Street, London, W.1, on **February 19**, at 2.30 p.m. The chair will be taken by Dr. A. E. Dunstan, president of the association.

The **Association of Scientific Workers**, N.W. Area Committee, has arranged an exhibition to illustrate the subject of "Chemicals in War and Reconstruction," and this will be opened by the Lord Mayor of Manchester on **February 19**, at Manchester Central Library. The exhibition, which will remain there until March 4, will show by photographs, diagrams, etc., the importance to the community of heavy chemicals, coal gas, plastics, rubber, petroleum products, textiles, paint and medicines.

Three Cantor Lectures on "Natural Resources of Great Britain" will be given before the **Royal Society of Arts**, John Adam Street, W.C.2, on **February 21 and 28**, and **March 6**, at 1.45 p.m. The first two deal

with Minerals and Underground Water respectively, and the lecturer will be Dr. E. B. Bailey, director of the Geological Survey. The third lecture will be by Mr. W. T. Halcrow on the subject of Hydro-electric Power.

A conference on industrial furnaces has been arranged by the **Institute of Fuel**, and will take place in Manchester at the Engineers' Club, Albert Square, at 2.30 p.m. on **February 23**.

A lecture on "The Literature of Alchemy" will be delivered by Mr. H. Cole, B.A., A.I.C., on **February 24**, at 7.30 p.m., at Radiant House, Cotham Street, St. Helens, Lancs, to the St. Helens section of the **British Association of Chemists**.

The Food Group of the **Society of Chemical Industry** is holding a joint meeting with the Nottingham section on **February 26**, at 2.45 p.m., in the lecture theatre of the Corporation Gas Showrooms, Nottingham, when Dr. V. L. S. Charley will lecture on "Fruit Juices and Related Products."

PLASTICS ORGANISATION

A scheme for the reorganisation of the British Plastics Federation was unanimously adopted at a recent extraordinary general meeting. One of the principal changes is to be the formation, within the Federation, of a number of groups, including a Plastic Materials Manufacturers' Group, having a large measure of autonomy and empowered to form special sub-sections. To assist buyers to distinguish between and describe plastic materials and products, the Council of the British Plastics Federation is to compile a glossary, which will include trade names and technical data, etc. It will be published by the Federation and will include information relating only to those products made by members.

CANADA'S MINING INDUSTRY

Canada is now supplying 40 per cent. of the United Nations' war requirements of aluminium, the Dominion's total production being six times that of 1939, and greater than the total production of the rest of the world in that year. Canada also supplies 20 per cent. of the Allies' zinc requirements, 12½ per cent. of the copper, 15 per cent. of the lead, 75 per cent. of the asbestos, and 20 per cent. of the mercury. Mercury production is a new industry for Canada, since the metal was not turned out in commercial quantities before June, 1940. Magnesium is now also produced on a commercial scale as the result of the discovery of the dolomite process worked out in the National Research Laboratories.

General News

From Week to Week

The annual meeting of the Scottish section of the British Association of Chemists is arranged for March 10. Nominations for the committee should be in the hands of the section immediately.

Timothy Whites and **Taylor**s, the chemists, have made an offer to **Mence Smith Stores** (Proprietors), Ltd., to purchase all the capital on the cash basis of 27s. for each £1 **Mence Smith Preference** share and 48s. for each Ordinary share.

A strike of boys employed at **West Calder** shale mine, the property of **Scottish Oils**, Ltd. ended last Saturday. The dispute arose from a misunderstanding over the **Porter** award. To make up for loss of production, the boys worked on Sunday and will to-morrow.

Twenty workmen were slightly injured when an explosion occurred on February 8 at a North-East zinc works. Blast caused considerable damage to factory premises and adjoining works buildings. The explosion took place in a workshop where experimental work was being conducted.

The **Executive Council** of the **National Union of Shale Miners and Oilworkers** have decided to forward an application to the shale oil companies for an immediate increase of 2s. per shift for employees of 18 years of age and over, and 1s. per shift for those under 18.

An anonymous gift, enabling the **Principal of the Heriot-Watt College**, **Edinburgh**, to make grants to assist men and women to obtain full-time technical training at the College on their discharge from **National Service**, was announced by **Principal Smail** at the meeting of the **Governors** of the College last week.

Recent researches have shown that boric acid is considerably more effective in destroying cockroaches, beetles and bakehouse pests than borax, and arrangements have again been made with the yeast distributors to have stocks of boric acid available. The following list of prices has been agreed with them: 1-cwt. packages at 67s. per cwt.; 14-lb. packages at 72s. per cwt.; 7-lb. packages at 74s. 8d. per cwt.

The revision of **B.S.S. 5.V.11.**, **Dry Gelatine Glue** (price 1s.), has been prepared in order to adapt the method of testing using beech test slips, which has been developed for testing casein glue. Apart, therefore, from the necessary modifications to the figure for tensile strength which has been adapted to meet the new method of test, the requirements have not been altered. The descriptions of the method of testing all follow the lines of the casein glue specification.

A revised edition of "Weight Lifting by Industrial Workers" (safety pamphlet No. 16) has been published by the **Stationery Office**, price 1s. "Production Authorities Guide," revised edition, is now available, price 3d.

A deputation of **Birmingham M.P.s** last week called on the **Board of Trade** and asked that a proposal for the transfer of the aluminium hollow-ware industry from **Birmingham** to **South Wales** be dropped. It is feared that **Birmingham** might lose this industry which in peace-time employs 3000 people.

Education officers are being appointed by certain great industries, said the **President** of the **Board of Education** last week, speaking in the resumed debate on the committee stage of his new bill. He expressed his determination to create further links between industry and the world of education, and the advisory councils proposed would be one of the best ways of achieving that.

Glass silk, now being used as an insulating material, has great potentialities for the future, said **Mr. W. H. Clapham**, chief chemist to a chemical and insulating company in the North-East, in a **B.B.C.** broadcast last week. He said that the silk should be very good for draperies and costumes, but added that at present it was not yet suitable to wear next to the skin.

The group companies of **Thomas Tilling, Ltd.**, are operating 320 public service vehicles on producer gas. This was revealed by the chairman and managing director, **Sir Frederick Heaton**, at the annual general meeting. He said that during twelve months 5,850,000 miles were run on this fuel, already a reasonably satisfactory substitute for petrol.

Withdrawal of producer-gas buses is urged upon the **Minister of War Transport** by the **Transport and General Workers' Union**, which states that their operation is the cause of physical discomfort and illness. "The vehicles are not popular with either drivers, conductors or passengers, and though the reasons for their introduction may have been sound, it is felt that they no longer have force," comments the union.

Lord McGowan, speaking in **Edinburgh** recently, visualised prefabrication as a "collaborator" with standard building methods. "I do not look for a completely prefabricated house," he said, "but for a combination of factory-made elements with standard building practice. In this way I hope we shall use some part of the productive capacity of our war-time factories in amicable collaboration with building labour."

As already predicted, the 9 per cent. rise in the price of tin has caused an increase in the Board of Trade index figure for the wholesale price of non-ferrous metals—the first for over a year. The figure has risen by 1.1. per cent. from 126.0 in December to 127.4 in January (1930 = 100), while that for chemicals and oils is up by 0.5 per cent., from 150.5 to 151.3. Iron and steel remain constant at 183.0.

Many British prisoners of war in Germany are making good use of their time. More than 3000 have now taken the examinations of the various educational and academic bodies, and no fewer than 1760 of these prisoner students were successful. These examinations are largely the outcome of the work of the Red Cross and St. John Educational Books Section, which at the end of last year had sent 190,000 books and over 8000 study courses to the camps.

The Wrought Light Alloys Development Association has received from the United States copies of three instructional films showing current American practice in the machinery, riveting, and welding of aluminium alloys. The association, whose address is Union Chambers, 63 Temple Row, Birmingham, 2, is prepared to lend these films to interested industrial and educational organisations, and will send a member of its staff to each showing, so that questions from the audience can be answered.

Calcium in bread was the subject of a question in the House last week. Sir E. Graham-Little referred to a demonstration recently made before a scientific society which proved, he claimed, that increased consumption of calcium raised the blood pressure. Would the Minister of Food institute an inquiry into this matter independent of the Medical Research Council, and stop adding calcium to bread until the findings of this inquiry were available? Colonel Llewellyn replied that he was advised that the addition of the small amount of calcium now added to bread was beneficial.

Foreign News

An alcohol industry based on bananas as the raw material is contemplated in Jamaica, states *Foreign Commerce Weekly*.

Argentina's exports of chemicals and drugs rose from 1,000,000 pesos in 1939 to 27,500,000 in 1942.

Bolivia is increasing production of tungsten. Output for 1943 amounted to 3600 metric tons as against 3363 and 2676 for 1942 and 1941 respectively.

The Ministry of Forestry and Mining of Yugoslavia is to start a joint stock company in the name of the Croat State for the purpose of building cellulose factories, reports the German News Agency. The company will bear the name "Cellulosza A.G."

Ecuador has become one of the biggest sources of quinine and totaquine in the Western hemisphere. Laboratories for the quick assay of cinchona bark have been established at Quito and Cuenca.

The use of biguanidine sulphate as a reagent for the volumetric extraction of nickel is described by A. K. Majumdar in the *Journal of the Indian Chemical Society* (1943, 20, 8, p. 289).

Latest monthly report of the W.P.B., Washington, with regard to munitions stated that the problems connected with magnesium and aluminium have been overcome. Indeed, efforts are now being made to find further uses for the magnesium available. The report adds that quartz-crystal output has been markedly increased.

A new high-vacuum process developed by the National Research Corporation, Boston, U.S.A. is expected to solve the problem of drying penicillin, and to reduce the processing time to 6 hours, instead of the 20-40 hours formerly necessary. The new process is being used by Chas. Pfizer & Co., and other makers of penicillin.

A commercial secretary has been appointed by the Department of Overseas Trade to the British Legation in Mexico City. Mr. K. Unwin, O.B.E., formerly commercial secretary at Madrid, has been assigned to the post, and is succeeded in Spain by Mr. A. R. Bruce, formerly H.M. Trade Commissioner at Montreal.

New uses for silicones were discovered in America in 1943. According to *General Electric Review*, January, 1944, new resins are being made from these silicon compounds which are far more heat-resistant than organic resins. Dri-film, one result of silicone research, has been developed as a new water-repellent, and many new materials can now be coated with an invisible film which prevents the condensation of water vapour.

The new ironworks at Lulea, owned by the Swedish Government and known as Norrbottens Järnverk, has begun production. The Government has fixed the price of the basic Martin pig-iron turned out by the factory's first electric furnace, which has a weekly capacity of 600 tons. A second furnace is to be started soon, and the annual capacity will then be about 60,000 tons. At present 300 workmen are employed.

The War Production Board of America estimates that penicillin production will have been multiplied 55 times by this spring, and that the price will again be reduced substantially. Nineteen companies are now producing it, but relatively little of the full capacity will be available until March. The ultimate authorisations granted by W.P.B. will result in quantities ranging from 400 million units a month, from the small laboratories, up to 20,000 million from large producers.

The Government of India, through the Department of Industries and Civil Supplies, has directed all manufacturers of toothpaste in British India to make a return of production costs, with a tabular statement of the costs of tubes, and all the chemical constituents of the paste.

Cell wools of the German type are being made by Hameenlinnan Verkatehdas O.Y. at Hameenlinna (Tavastehus) in Finland. The production was increased tenfold during the past year, when machinery from a synthetic resin factory was adapted to the manufacture of cell wool.

New chemical factories to be erected in Spain include a calcium cyanamide plant with an annual capacity of 20,000 metric tons, in Santander province (M.D. Reynolds), and a cellulose acetate factory (1920 tons per annum) with facilities for acetate rayon manufacture, in the province of Barcelona (Industrias del Acetato de Celulosa, S.A.), according to official reports published in *Ion* (1943, 26, 593).

Company News

The Kern Oil Co., Ltd., is paying a dividend of 6 per cent. (same) for the year to May 31 last.

English Clays Lovering Pochin and Co., Ltd., announce a net profit, for the year ended September 30, of £79,494 (£74,799), and a dividend of 2 per cent. (same).

The South African Torbanite Mining and Refining Co., Ltd., show a net profit of £57,453 (£46,175) for the year ended June 25 last. Tons of torbanite extracted during the year were 130,488, against 120,155.

Minerals Separation, Ltd., report for the year ended December 31 a profit of £88,102 (£68,982) before deduction of tax, etc. The proposed final dividend is 20 per cent. (15 per cent.), making a total of 30 per cent. (25 per cent.).

The directors of the **Gas Light and Coke Company** recommend the payment, on April 1, of final dividends of $1\frac{1}{2}$ per cent. ($1\frac{1}{4}$ per cent.) on the "maximum" stock, making $3\frac{1}{2}$ per cent. ($1\frac{1}{4}$ per cent.), and of $2\frac{1}{2}$ per cent. (1 per cent.) on the ordinary stock, making 4 per cent. (1 per cent.) for the year ended December 31.

New Companies Registered

Plasticast Developments, Ltd. (385,463).—Private company. Capital: £5000 in 5000 shares of £1 each. Metal workers, manufacturers of and dealers in engineering supplies, plastics, chemicals, gums, colours, etc. Directors: H. A. Stock, A. J. Wilmot, H. Pitts, F. S. Goodman. Registered office: 31 Priestgate, Peterborough, Northants.

Plastic Processes, Ltd. (385,427).—Private company. Capital: £10,000 in 10,000 shares of £1 each. Manufacturers of and dealers in plastic or colloidal substances and materials, and goods produced therefrom, chemists, paint and varnish manufacturers, etc. Subscribers: C. H. Treble, E. W. Rosier. Registered office: 10 Lower Grosvenor Place, S.W.1.

Chemical and Allied Stocks and Shares

SOME improvement of business in the stock and share markets was reflected by firmness in industrial and other securities, though movements were on balance mostly small. British funds continued to show a trend to higher prices.

Imperial Chemical strengthened from 38s. to 38s. 3d., at which the yield works out at over 4 per cent. on the basis of the 8 per cent. dividend which has ruled in recent years. Borax Consolidated kept at 37s. 9d., pending the dividend announcement. Moreover, Lever & Unilever remained at 36s. 6d. General expectations are that the dividend of the last-named company may again be limited to 5 per cent., but that after the war there is likely to be good scope for the dividend rate returning to the pre-war level of 10 per cent. British Aluminium at 47s. 9d. were unchanged on balance, while British Oxygen were again 80s. 6d. The units of the Distillers Co. held their recent improvement to 89s., and United Molasses were 32s. 4½d. United Glass Bottle were again 60s., and Forster's Glass 10s. shares were 31s. 3d. The prevailing assumption is that the distribution of the last-named company is likely to be kept at 15 per cent. Canning Town Glass 5s. ordinary remained active at 8s. 10½d. British Indestructo Glass 2s. shares (now 4s. 3d.) fluctuated after publication of the results and the resumption of dividends with an interim payment of 5 per cent. for the current year. Triplex Glass reacted 6d. to 37s. 1½d. Elsewhere, Gas Light & Coke ordinary were firm at 20s. 6d. on the 4 per cent. dividend for 1943.

Turner & Newall continued a good feature, and further improved from 79s. to 80s. Wall Paper deferred strengthened to 37s. 9d., while International Paint held their improvement to 115s., awaiting the dividend announcement. B. Laporte continued firmly held and were again quoted at 75s., while W. J. Bush were 60s. Monsanto Chemicals 5½ per cent. preference were 23s. 6d., and British Drug Houses 23s. Greeff Chemicals 5s. units were 7s. 3d., and Burt Boulton ordinary 22s. William Blythe 3s. shares remained firmly held and quoted

at 9s. Among plastics, De La Rue eased from 157s. 6d. to 156s. 3d., while Erinoid 5s. ordinary were 10s. 9d., and British Industrial Plastics 2s. ordinary were again 6s. 9d. Awaiting the dividend announcement, Lacrinoid Products 2s. ordinary have changed hands around 4s. 6d. Imperial Smelting were 13s. 3d., Amalgamated Metal 17s. 9d., and Allied Ironfounders 49s. 6d. Elsewhere, Associated Cement eased from 63s. 6d. to 64s. British Plaster Board 5s. ordinary strengthened further from 29s. 6d. to 29s. 9d.

In iron and steel shares, Dorman Long at 28s. 7½d. were unchanged on balance, while United Steel were 24s. 1½d., and Richard Thomas 6s. 8d. ordinary again 9s. 6d. Stewarts & Lloyds moved up from 53s. 6d. to 54s. 1½d., and Tube Investments were firm at 96s. 4½d. In the textile section, Bradford Dyers have been maintained at 21s., and Calico Printers at 16s. British Celanese moved up from 26s. 6d. to 27s. 6d. Courtaulds were higher at 53s. 9d., awaiting the dividend announcement which is due shortly.

Elsewhere, Boots Drug further improved from 42s. 6d. to 43s. 6d. Timothy Whites were active, but at 32s. 9d. were below the level of a week ago. Sangers were better at 24s. 1½d. compared with 32s. 7½d. Morgan Crucible 5½ per cent. preference were 27s. British Glues 4s. units were 7s. 6d. Lewis Berger remained active and changed hands up to 98s. Murex have been firm at 101s. 10½d., while Dunlop Rubber remained firm at 40s. 6d. Among oil shares, Anglo-Iranian were higher on balance; sentiment remained under the influence of Mr. Eden's statement on the proposed Middle East pipeline.

British Chemical Prices

Market Reports

STEADY to firm price conditions generally rule in the London market for heavy chemicals this week and a moderate volume of fresh inquiry is reported from most sections. Supplies against contracts are being

taken up at a steady rate and deliveries are well up to schedule. Among the soda products the call for supplies of both salt cake and Glauber salt has been steady, and fair quantities of hyposulphite of soda and nitrate of soda are being taken up. The position of soda ash and bicarbonate of soda remains the same, and sellers are meeting with a steady call for supplies. A moderate demand for acetate of soda is reported. No change of importance has taken place in the potash section. Yellow prussiate of potash is in short supply relative to requirements and values remain firm. Acid phosphate of potash is in good demand and quotations are firm. In other directions British-made formaldehyde is well held, and a fair trade is passing in peroxide of hydrogen and alum lump. White powdered arsenic is a good market. There is nothing of importance to report from the coal-tar products market. Most grades of creosote oil are finding a ready outlet and supplies of carbolic and cresylic acid are readily taken up. A fair request for the naphthas is reported, and toluols and xylols remain steady.

MANCHESTER.—There has been a moderate volume of fresh inquiry on the Manchester chemical market during the past week, extending over a good range of bread-and-butter lines, and additions to order books have been made. Heavy chemicals for the textile bleaching and finishing trades have been moving steadily into consumption against contracts, while specifications for rubber-proofing and other leading user industries have been circulating fairly satisfactorily. Little change has occurred in trading conditions in the by-products section. New business this week has not been extensive but contract deliveries of both the light and heavy materials have been substantial.

GLASGOW.—There has been a general improvement in the position in the Scottish heavy chemical trade during the past week for home business. Export trade still remains rather restricted. Prompt delivery is getting more difficult. Prices remain very firm.

"Fullersite"

H. B. Gould, Port Penhryn, Bangor

A Slate Powder in great demand as the most economical filler for Vulcanite and Moulded Rubber Goods.

HYDROGEN PEROXIDE

Concentrated Qualities. Dyestuffs & Chemicals

COLE & WILSON, LTD.

24, Greenhead Road, HUDDERSFIELD

Phone: Huddersfield 1993. Grams: 'Colour' Huddersfield

"LION BRAND" METALS AND ALLOYS

MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc.

BLACKWELL'S
METALLURGICAL WORKS LTD.
GARSTON, LIVERPOOL, 19

ESTABLISHED 1869

BRITISH ASSOCIATION OF CHEMISTS

Unemployment Insurance,
total funds over £31,000
Legal Aid. Income Tax Advice.
Appointments Service.

Write for particulars to:—

C. B. WOODLEY, "Empire House,"
C.R.A., F.C.I.S., 175, Piccadilly,
General Secretary, S.A.C. London, W.1
Phone: REGENT 6611

EDUCATIONAL

Great Possibilities for
QUALIFIED CHEMICAL ENGINEERS

Key Men in Wartime and Afterwards.
MANY of the finest posts in Britain in Wartime are reserved for Chemical Engineers. The same will be the case when the war is over. The vast technique and experience now being applied to Chemical Technology for war purposes will then be suitably utilised in reconstruction, and in trade and commerce. Enrol with the T.I.G.B. for A.M.I.Chem.E. Examinations in which home-study Students of The T.I.G.B. have now gained—

THREE "MACNAB" PRIZES.

Including the "MacNab" Prize awarded at the last (1943) Examination. Write to-day for "The Engineer's Guide to Success"—free, containing the world's widest choice of Engineering Courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,

219 Temple Bar House, London, E.C.4.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

FOR SALE

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

PUMP. Vertical, 3 Throw, by Bailey; 10 in. Plungers by 14 in. Stroke, geared belt drive. THOMPSON & SON (MILLWALL), LTD., Cuba Street, Millwall, London, E.14. East 1844.

SODIUM ACETATE. Approximately 12 tons available. Specification: Acetate 96 per cent., Chloride less than 0.05 per cent., impurities less than 1 per cent. £46 per ton ex works. Subject to being unsold.

The County Chemical Co., Ltd.
Chemico Works, Shirley, Birmingham.

1000 REBUILT Hydro Extractors by all leading makers from 18 in. upwards with countershafts attached and safety covers. Jacketed Steam Pans, various sizes. List on request. Seen at Randaile, Arundel Terrace, Barnes. Telephone: Riverside 2436.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each. Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilson, Springfield Mills, Preston, Lancs. Phone 2198.

Secondhand

VACUUM AND ROTARY PUMPS

for sale.

HORIZONTAL double acting WET VACUUM PUMP, 8 in. bore by 10 in. stroke; 4 in. suction; driven from f. and l. pulleys; spring loaded; plate valves.

Horizontal double acting ram type steam jacketed TAR PUMP by The Power Gas Corporation, 4 in. dia. by 6 in. stroke; plunger type valve gear; 2 in. suction; mounted on cast iron bedplate; motor platform and driven from machine cut gearing. No motor available.

2 in. Regulas metal centrifugal ACID PUMP by Haughton; fully glanded spindle; mounted on extended cast iron bedplate for direct motor drive.

All Bronze centrifugal ACID PUMP by Robinson of Stockport; 1½ in. suction and delivery; mounted on self-contained bedplate; outer bearings and fitted f. and l. pulleys.

Belt driven horizontal WET VACUUM PUMP by Koch Bauntlemann; cylinder 13 in. dia. by 13 in. stroke; arranged with rubber disc valves; driven by f. and l. pulleys 42 in. dia. by 7 in. face.

Horizontal cast iron ROTARY VACUUM PUMP, 9½ in. dia. inlet and outlet connection; driven by belt pulley 3 ft. 0 in. dia. by 9 in. face; mounted on cast iron bedplate.

Horizontal steam driven WET VACUUM PUMP by Worthington, 6 in. by 6 in. by 12 in.; 2½ in. and 2¼ in. vacuum connections; 1 in. and 1½ in. steam connections.

Horizontal belt driven ROTARY PUMP by Kestner Evaporator Engg. Co.; 1 in. suction and delivery connections; gummetal rotors; arranged with glanded shafts and driven by f. and l. pulleys; mounted on cast iron baseplate.

GEORGE COHEN, SONS & CO., LTD.,

STANNINGLEY, near LEEDS and
WOOD LANE, LONDON, W.12

'PHONE 98 STAINES.

7 FT. 0 in. by 2 ft. 0 in. Powder Mixer. 23 Chamfer Filter Press, 26 in. square. Jacketed Steel Pan, (6) 2 ft. 1 in. by 20 in. Small Oval Jacketed Vacuum Oven.

HARRY H. GARDAM & CO., LTD.,
STAINES.

WANTED

WANTED.—Supplies of Nitre Cake in ten-ton lots. Box No. 2126, THE CHEMICAL AGE, 154 Fleet Street, E.C.4.

SERVICING

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East

MONOMARK. Key labels, 3 for 1s. 3d. Permanent confidential London address. Letters redirected. Write—BM/MON03C, W.C.1.

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

COUPON-FREE CLOTHING

OF SPECIAL INTEREST TO
CHEMICAL WORKERS



EX-POLICE ALL WOOL SERGE SUITS (Jackets and Trousers)

Tested and found impervious to
Acids, etc. Grade I Garments.
Thoroughly cleaned and recondi-
tioned

35/- per suit



The above line has been tested in
contact with all the well known
Acids and Alkalis, and has shewn
highly resistant qualities in all cases

SAMPLE FORWARDED ON REQUEST

Terms: Nett m/a. Carriage paid on
orders over £10. Delivery: ex stock

Willson Brothers

EPSOM : SURREY

(Phone: Epsom 1293)

The first and best Acid Resisting Alloy

TANTIRON

Sole Manufacturers :

Lennox Foundry Co. Ltd.

Glenville Grove, London, S.E.8

Specialists in corrosion problems

COMPLETE PLANTS FOR
VENTILATING
FUME & DUST
EXTRACTION

GOOD DELIVERIES
CENTRIFUGAL OR PROPELLOR
FANS

MODERN PLANT LTD.

BILLESDON LEICESTER

TELEPHONE BILLESDON 261
GRAMS "CONVEYOR - LEICESTER"

"ZULO"



CARBOY HAMPERS

**LEIGH
& SONS
METAL
WORKS**

Orlando St.
BOLTON.

IRONAC METAL FOR RESISTING ACIDS

VALVES, TAPS AND CASTINGS
FOR CORROSIVES

**HAUGHTON'S METALLIC
CO., LTD.**

30, St. Mary-at-Hill,
London, E.C.3

PYREX

REGD. TRADE MARK

BRAND.

GRADUATED

GLASSWARE

By specifying "PYREX Brand" when ordering Graduated Glassware you are assured of obtaining strong serviceable glassware, with division lines and numerals etched clearly and precisely, for easy reading.

For everyday laboratory work PYREX Brand Glassware is graduated to N. P. L. class B standard, but for more meticulous analysis or intricate research work, N. P. L. class A can be supplied at the appropriate extra costs.

PYREX Brand Graduated Glassware is supplied only through Laboratory Furnishers, but illustrated catalogue and two free copies of our Chemist's Notebook will be sent direct on application to us.

Ask for PYREX Brand and see that you get it!

JAMES A. JOBLING & CO. LTD.

WEAR GLASS WORKS, SUNDERLAND.

G-12

use...

ACTIVATED ALUMINA

(BRITISH MANUFACTURE)

of high adsorptive efficiency for dehydration of gases and liquids, oil refining and air conditioning, and as an effective catalytic agent for many chemical reactions...

ALL ENQUIRIES TO:-

PETER SPENCE & SONS LTD

NATIONAL BUILDINGS • MANCHESTER 3

LONDON OFFICE (SOLICITORS ADDRESS) 4, HAMMER GREEN - BAILING 10 8

A2

TO SAVE YOUR OIL

is to-day vital to the community! In addition, it cannot fail to interest you that by filtering your used lubricating oil for continued re-use you will make a substantial saving for yourself.

To conserve oil stocks is essential while world communications are difficult. To do so by means of the Stream-Line filter makes a saving for you which will repay the cost of the filter in a few weeks. Did you realise that, in addition, the use of a Stream-Line filter ensures better lubrication than ever before? It encourages you always to run on clean oil, to use a good grade and thus to reduce engine wear.

LIMITATION OF SUPPLIES

All oil is nationally important, but for the time being filters can only be supplied to users having batches of oil of known grade sufficient to justify the size selected and having a direct use for the filtered oil.

Those unable to secure a filter at present should nevertheless save their oil. Arrangements for its disposal will be advised on request.

STREAM-LINE FILTERS LTD.

Hele-Shaw Works, Ingate Place,
LONDON, S.W.8.

EXPERTS IN OIL FILTRATION.

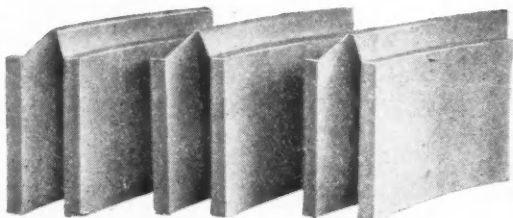


**For
Ma
Res**

FI

Printed
BENN

**For
Maximum
Resistance-**



"NORI"

**ACID RESISTING
WARE**

Exceptionally prolonged service is assured when Tanks, Towers, Scrubbers, etc. are lined with Accrington "Nori" Ware.

Impervious to acids and most other chemicals.

Data and Estimates on request.

ACCRINGTON BRICK & TILE CO.

ACCRINGTON

Phone - - Accrington 2684

**BRITISH
LECITHIN**

has been found invaluable for some years past in the

CHOCOLATE TRADE
SUGAR CONFECTIONERY,
TOFFEES, ETC.
BAKERY TRADE, BREAD AND
CAKES
BISCUIT TRADE

MARGARINE AND COMPOUND
TRADE
LEATHER TRADE
RUBBER TRADE
VARNISH TRADE

TOILET PREPARATIONS

Technical assistance will be gladly given.

**FREDK. BOEHM
LTD.**

**"Rowanhurst,"
Grove Road,
BEACONSFIELD, BUCKS.**

CARBOY HAMPERS

Safety Crates Packed Carboys



"VULCAN" BRAND

HARRIS (LOSTOCK GRALAM) LTD.

Lostock Gralam Northwich

Telephone:

2217 (2 lines) NORTHWICH

Telegrams:

"VULCAN" LOSTOCK GRALAM

COPPER PLANT

for the CHEMICAL TRADES



*Large Steam jacketed copper
boiling and mixing pan with
geared agitators, steam jacket
of mild steel.*

**STILLS
RECTIFYING
COLUMNS
CONDENSERS**

**Autoclaves
Calandrias
Vacuum Pans
Boiling Pans
Pipework,
Coils, etc.**

BLUNDELLS &**T. ALBERT CROMPTON & Co. Ltd.**

WEST INDIA DOCK RD., LONDON, E.14

Phone:

East 1518 (4 lines)

Grams:

Blundell, Phone, London

ESTABLISHED 1825

MONITOR

(PATENT)

MIXING MACHINES

"THE PERFECT MIXERS
THAT
MIX PERFECTLY"

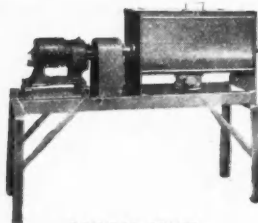
RAPID

SILENT

DUSTLESS

EFFICIENT

BELT DRIVEN OR
MOTORISED



POWDER MIXER
with direct-coupled motor drive

SPECIAL FEATURES
REMOVABLE BEATERS
DUST-TIGHT LID &
BAGGING-OFF VALVE
WELDED CONSTRUCTION

MADE IN TEN
USEFUL SIZES

WRITE FOR LIST M559

THE PASCALL ENGINEERING CO., LTD.**MONITOR WORKS, 114 LISSON GROVE, LONDON, N.W.1**

Telephone: PADdington 7236-7237

Telegrams: "Pasenco, Phone, London"

